JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

A Tardy Conversion.

POLITICALLY, Scotland has long declared itself seriously radical, but in relation to its gas supply, seriously conservative. We cannot refrain from a little musing on the latter state after looking into the Provisional Orders that the Corporations of Glasgow and Aberdeen have introduced, for the coming session, under the Private Legislation Procedure (Scotland) Act, 1899; and we are hoping these two Orders are destined to be valuably operative in breaking down the conventional high illuminating power of gas across the Border. When the matter is thoroughly inquired into, and the defence of the intemperance that has existed in relation to gas illuminating powers in Scotland is weighed, it is easy to perceive that underlying it is, to a large extent, pure fancy with a no more substantial base-work than custom. It is a case of custom mocking the mutability that invests use with more scientific conditions. The rich coal supply best available to some of the Scotch undertakings owing to their geographical situation has admittedly much to do with the higher illuminating powers than obtain in England; but the excessive richness in many cases, and the bolstering up of illuminating powers that goes on, indicate in what a considerable measure tradition is held superior to the practical considerations of the present day. The composite character of the human mind is a matter that we cannot stop to inquire into here; but the thought passes that, while high illuminating powers are traditional in the Scotch gas industry, so are economy and thrift among our kinsfolk generally in Scotland. In the present day, when richness in gas supply is repugnant to economy, having regard to the methods of use, we cannot reconcile their traditional high illuminating power with traditional economy and thrift; and what is more we do not intend to attempt such an insuperable and thankless task.

Mr. William Foulis, his successor, Mr. Alexander Wilson, Mr. W. R. Herring, and others have proclaimed the correctness of the doctrine of lower illuminating powers for Scotland as elsewhere, and have supported it by example in the case of Glasgow, and have endeavoured to produce in Edinburgh the condition that would give a like support. Perth many months ago adopted for the testing of its gas the new Metropolitan argand burner No. 2; Glasgow in its present Order are doing the same; and Aberdeen are asking for a similar right. Glasgow has the power to supply 16-candle gas, and is now supplying 18 candles tested after the same manner—by a flat-flame burner—that obtained some 38 years ago when the Corporation acquired the works. With the gas properly treated, the change should result in economy. The Aberdeen Corporation, whose prescribed illuminating power is 20 candles, are making preparations for supplying down to 15-candle gas, if circumstances demand or are propitious; and they are also, as mentioned above, taking power to use the Metropolitan No. 2 burner, which is well suited for all gas up to 20-candle power. At the present time the Corporation are, we believe, distributing somewhere about a 22-candle gas tested, not as it was three or four years ago by an iron union-jet burner, but by a Bray steatite topped burner. By this simple change in the manufacturing practice of Mr. Samuel Milne at the Aberdeen Gas-Works, there has been an economy effected which is represented by 2 candles. But in the Aberdeen Order, there is a provision that so long as the gas supplied by the Corporation with respect to its illuminating power is more than 20 candles, the burner to be used shall still be the union-jet. There ought not to be in Aberdeen any occasion to require to supply a gas of higher illuminating power than 20 candles tested by the Metropolitan No. 2 burner, even allowing liberally for Mr. Milne's profession at the last North British meeting that he is not a defender of low-quality gas. However, these proposals in the Provisional Orders of Aberdeen and Glasgow—to relegate to the ranks of things that have been the old-fashioned unscientific method of testing gas, which gives to it an erroneous and incomparable value, and in the case of Aberdeen to provide the right to supply an all-round useful gas of reasonable illuminating power—are movements that cannot be disregarded in connection with this tardy conversion, when taking account of the trend of events.

In the opening paragraph, custom was accused of being the cause of the retention of high illuminating powers more than necessity and economy. It may come as a surprise to many gas engineers to learn that though the illuminating powers supplied in Scotland range between 18·5 and 29 candles, there are at present only two authorized gas undertakings supplying under 20-candle power gas, and there are only eleven out of fifty authorized gas undertakings which have a prescribed illuminating power of 20 candles or upwards. Actually out of the fifty authorized concerns, 27 have an illuminating power prescribed of 14 candles; and the gas supplied by them severally is at a figure between 20 and 29 candles. Five concerns have a prescribed illuminating power of 15 candles; four of 16 candles; two of 18 candles; nine of 20 candles; one of 21 candles; one of 22 candles; and one fortunate undertaking—Renfrew—has no prescribed illuminating power at all, but 24-candle gas is distributed. The absurdity of this veneration of high and wasteful illuminating powers is emphasized when it is found from the last-issued Board of Trade returns that, in the twelve months covered by them, in Scotland alone 274,381 gallons of benzol and 4156 tons of gas oil were used by sixteen undertakings out of fifty to fatten the gas sent out. However it may be hoped that—incandescent gas-burners, gas fires, stoves, and gas-engines being the most approved channels of utilization for gas—we are now at the dawn of changed opinion and policy in Scotland, when a common-sense gas meet for all purposes will take the place of gas of an inflated richness, which is a mistake in the economics of both production and service. One good feature of the outlook is that the majority of the undertakings have no statutory responsibility in regard to illuminating power beyond the common standards applying in England.

Provisional Orders—A Point in Gas Testing.

IN addition to the applications to the Secretary for Scotland, the principal feature of which is noticed in the preceding article, there are only half-a-dozen Gas Provisional Orders introduced for the consideration of the Board of Trade. But, speaking generally, they are not very noteworthy; their main object being additional money powers, which, of course, is a good index of the prosperity of these smaller concerns. It is observed that the applicants are exactly divided in asking for borrowing powers equal to one-fourth and one-third of their issued capital. There seems to be no reason why they should not all enjoy the increased liberty of the one-third proportion, instead of the one-fourth that was the rule in former days. The Seaford Gas Company are proposing to put themselves under the 10 and 15 per cent. restriction as to discounts—a course for which we cannot now find any rational explanation. There is also a purchase clause in this Company's Order, operative for five years, in favour of the District Council.

In regard to illuminating power and testing, the smaller Gas Companies are falling into line in adopting modern conditions. The Seaford Company are suggesting 14-candle gas, tested in accordance with the new model clause. Then, following certain precedents of last session, the Twyford (Berks) Company are contemplating a 13-candle standard, tested by the Metropolitan argand burner No. 2 with a 6-inch by 1⅛-inch chimney; and, "if at any time the gas-flame "tails over the top of the glass, a 6-inch by 2-inch chimney "shall be used." The quoted provision is rather a singular one in association with the Metropolitan argand burner No. 2;

and we rather suspect that the idea of the second chimney has been merely lifted from the old London argand clauses by the draughtsman of the Twyford Order, who was not aware that it was now unusual. The Departmental Committee of the Board of Trade distinctly recommended a fixed diameter of chimney with all qualities of gas; and the Metropolitan Gas Referees, conforming to the recommendation (as is easily possible with the now common illuminating power standards and the Carpenter burner), only prescribe the one chimney of 1⅜ inches internal diameter. On the other hand, the 2-inch chimney may have been proposed in the Twyford Order under a misapprehension, as an alternative to one part of the Gas Referees' instructions.

In the first place, the Referees say: "The damper for "regulating the air supply to the burner shall be screwed "upwards until the flame is on the point of tailing above "the chimney, and then immediately be turned down only "so far as to ensure that the flame burns without any "smoking." But the prescription to which we particularly refer comes a little later. When the air-damper is screwed down to afford the maximum air supply to the flame, neat coal gas of (say) 19-candle power and upwards will tail above the chimney; but the Referees make provision for the retention of the one chimney by prescribing that, when the gas is so rich that it cannot be made to burn at the prescribed rate without tailing above the chimney or smoking, the rate of consumption is to be reduced below the 5 cubic feet per hour until the flame burns properly within the chimney. No doubt the change to a wider chimney would postpone by a little (say, ¼ or ½ candle) the tailing-point with gas of gradually increasing richness, and consequently the necessity for coming below the 5 cubic feet rate. If the Twyford provision has been put in designedly, this must be its object; but as tailing does not occur until the damper is brought into action, unless the gas is coal gas of about 19 candles or over, it seems, to say the least, rather absurd to make such a provision in an Order asking for a 13-candle standard. With a mixed coal and water gas, the tailing point would be still higher.

The matter to which attention is here directed is the only novel one in the applications for Gas Provisional Orders in the coming session; and the novelty, it seems to us, is due to a mistake. If not, the reason should be of interest.

"Safety" Lighting in Purifier-Houses.

The Alliance and Dublin Consumers' Gas Company, their Chairman (Alderman W. F. Cotton, J.P.), and officials, may be congratulated that the effects of the explosion in the purifier-house at the Brunswick Street works last week were less serious than the first reports led one to suppose. Several men were unfortunately injured, and news reached London yesterday evening that one had succumbed; but our latest intelligence from the Chief Engineer (Mr. W. F. Cotton, jun.) is that most of those whom it was necessary to retain at the hospital are progressing favourably. Little structural injury was occasioned. This is an accident of a class that, in gas-works, great precautions are taken to avert. In this instance, it appears the men were working on the revivifying-floor beneath the elevated purifiers; and from some, as yet, unexplained cause, gas had accumulated under the boxes. The gas becoming ignited, the flame struck downwards, and burnt the men. It is from the point as to how the gas became ignited that perhaps a lesson is to drawn for future guidance. In a purifier-house where explosive mixtures may fortuitously be formed, the question of lighting has always been one for the careful consideration of gas engineers; but with all the care exercised, the old hand safety lamp, used by not too scrupulous workmen—among whom familiarity has all too often a bad way of breeding contempt—has, on becoming damaged, produced lamentable results. To avoid this, to enable night operations to be carried on with safety to both men and property, and to render unnecessary the use of a naked light anywhere in the vicinity of the purifier-houses, the Dublin Gas Company are among those who have introduced electric lighting plant. But this accident, it would appear, has proved that care must be taken as to how electric lighting is employed in purifier-houses. Mr. Cotton informs us that, so far as can be ascertained, the cause of the gas igniting is attributable to the fusion of an electric wire. The report of the occurrence in the "Freeman's Journal" states that: "The electric lamp bulb "hangs inside a metal frame, from the top of which the "wire stretches. This coil of wire was stripped for a space, "the insulating material was fused, the wire had sparked, "and the spark had caught the gas, causing the explosion. "Our representative was shown the defaulting lamp soon "after the occurrence." From this, it is patent, that the current was supplied to the electric lamp by flexible wires; and that it was "stripped for a space." From what has been learnt concerning the use of flexible electric wiring where the insulation is liable to be damaged, the avoidance of its use in the rough operations of a purifier-house, and in the hands of men more or less indifferent to danger, is to be commended. The experience suggests that (excepting perhaps the self-contained portable electric safety lamp) the electric lamp in the purifier-house does not offer, unless fixed and out of harm's way, any perfect security. And when fixed, much would depend upon how the work was done.

Competition in Australia.

As in unity there is strength, so also is there in conference. However strong and self-reliant a man may be, he is made all the stronger by being brought into contact with his fellows, and having an opportunity for interchanging views and experiences. Applying this to the gas profession, its truth has been accepted and proved wherever gas men are located within reasonable distances of each other; and if true in their favourable circumstances, how much more must it be so where gas men are separated by great distances, as, for example, in the case of the gas engineers and managers of Australia? With the high value we always place upon professional conference, the members of the Victorian Gas Managers' Association will fully agree, after the very successful meeting (reported in this issue) that they held early in November in Melbourne, under the presidency of Mr. R. O. Thompson, the Consulting Engineer of the Melbourne Gas Company. Young as the Association is, it has already, through this meeting, declared to the onlooker certain things; among them being that the gas profession of Australia is constituted of strong and self-reliant men, in whose hands the gas interests committed to their charge are safe, even hemmed in as they are, excepting in the case of the large cities and towns, by most disadvantageous circumstances. Remoteness from large centres and limited scope are two of the greatest disadvantages to cheap trading of any kind; and when to these is added competition, in which the old inhabitant does its best, within tight boundaries, to strangle the new, and the new to evict the old, the position calls for the exercise of the utmost resource. The smaller gas undertakings in Australia are at the present time engaged in the struggle with the (for them) new-born competition. Hence the considerable attention that was devoted to this subject, and generally to the commercial side of the gas business, at the recent meeting of the Association.

The Inaugural Address that the President delivered was a homely composition, in which he gave a superficial view of the current position of many interesting matters appertaining to Antipodean Gas Supply. The industry there has, in company with all other industries, suffered from the depression that followed the great boom of a few years ago. But the heavy cloud is lifting; and the gas industry is participating in the enjoyment of the brighter conditions. But it is a remarkably clear sky that has no cloud; and a cloud in the present more open sky of the Australian gas industry is constituted, as at home, of increased prices for coal and freights. But Mr. George Swinburne, whose interests in gas supply in Australia are many and wide, does not despair of the gas undertakings, by economical working, and by following a progressive policy, being able to pull through what, it is hoped, will only be a temporary drawback, without raising the price of gas to consumers. And considering the prices of gas in Australia, particularly in the smaller towns—owing to the heavy capital expenditure due chiefly to their isolated condition, and to in some cases the manner of their starting—those prices will not stand much tampering with in the upward direction, if the electric light is, in those places that are so small that they cannot with profit give elbow-room to two competing systems, to be defeated by the process of exhausting its strength to a point that will allow it to exist no longer. This touches on the paper presented by Mr. Bearup, of Hamilton, treating of the competition of electricity in small towns.

What the towns of modest population in Australia are going through at the present time is the reflection, on perhaps a reduced scale, of what has occurred in this country.

The smaller towns at home have been largely exploited by manufacturing concerns who have electricity plants for sale, and who (or some of them) have not much care as to what will happen later on, so long as they secure for themselves a profit on their machinery, cables, wires, and fittings. The same in Australia. When, again, the electric light is first introduced, the love of some people for being *à la mode* rises superior to other considerations. The same in Australia. But the experience in this country shows that the "other "considerations" ultimately sober down the love for what is, on its entrance, considered to be the fashionable light; and in numbers of residential towns, with the active competition of the gas undertakings, and the supply of lower illuminating power gas suitable for incandescent gas lighting at a cheaper rate, the electricity people are finding great difficulty in making both ends meet, and some cannot do so. There will be a day of heavy reckoning for certain of these undertakings, when plant requires renewal, with no sum for it set aside, and the poor financial returns upon present investment insufficient to induce investors to sink further money in the concerns. The same—notwithstanding the efforts made to enrol electricity consumers as shareholders—it may be predicted will happen in Australia, where, as here, an electricity undertaking has not so many branches to its business (all contributing support) as a gas undertaking, and where, as is not the case here, in the smaller towns, limitations as to time of use are placed upon the electricity consumers, of which, with other disagreeable experiences, they must tire in time. If experience at home under, it is true, somewhat different circumstances, is of value to Australia, then that experience is not encouraging to the hope of making electricity supply profitable in small residential towns, and therefore the experience likewise does not in such places encourage the idea of amalgamating the concerns, as was proposed by Mr. Bearup. Even in Australia, although such amalgamation enables the suppliers to maintain prices both for gas and electricity, instead of cutting them as where the undertakings are opponents in business, the successful amalgamation is the exception to the rule. Following the liberal policy advocated by Mr. George Swinburne, Mr. P. C. Holmes Hunt, and others, in the course of the animated discussions on Mr. Bearup's paper and that by Mr. W. Morris, on "Selling Gas," together with the exercise of the utmost economy in manufacture—not forgetting that a gas rich in illuminating power is not required where flat-flame lighting, as in many places in Australia, has been so largely abolished—then there can be little question as to the issue. "Confidence is the companion of suc- "cess;" and this meeting of the Victorian Association tells throughout of the confidence and of the virile constitutions of the members. One point more. Reverting to the address of the President, it seems that the State Legislature are more alive to the importance of the protection of gas and water pipes than are the Government of this country, for they have inserted a clause, in (what we take to be) a general measure dealing with electric tramways, safeguarding the pipes from the danger of electrolysis.

The Sulphate of Ammonia Market Last Year.

In another part of to-day's "JOURNAL" will be found some extracts from Messrs. Bradbury and Hirsch's "Review of the Market for Sulphate of Ammonia during 1906." This residual product of the distillation of coal figures so conspicuously in a gas manager's working statement that he is naturally concerned with the fluctuations in the market and interested in their causes. These are the matters which form the substance of the above-named pamphlet; and they deserve attentive consideration. Though sulphate of ammonia is, as the authors say, the *raison d'être* of their "Review," they first discuss the situation of nitrate of soda, because of its most important bearing upon the staple article. We, of course, can only give extracts from this portion of the pamphlet; but the whole of the authors' remarks on the subject are worth perusal by those who possess the "Review." Contrasting the two materials, it is shown that the average price of sulphate of ammonia delivered f.o.b. Hull last year was £12 0s. 9d. per ton, while that of 95 per cent. nitrate of soda at Liverpool was £11 6s. 7d. per ton; and Messrs. Bradbury and Hirsch say it must be admitted that the result is disappointing. At the same time, when all the circumstances of the case are considered, they do not think the price is much below what the actual situation has justified. They do not see that the market has at any time suffered much from the operations of speculators. On the contrary, they think speculators have suffered more at the hands of the market. They estimate that the production of ammonia, calculated into sulphate, from all sources, in the United Kingdom last year was 283,500 tons, compared with 268,500 tons in 1905 and 217,500 tons in 1901. The most marked increase in this period has been the production from coke and carbonizing works and producer gas; the figures having risen from 18,000 to 55,500 tons. Looking to the future, Messrs. Bradbury and Hirsch say that, though a substantial increase in the production of sulphate may be counted upon, they do not think it likely to exceed 5000 or 6000 tons within the next four months. But they point to the enormous extension that has taken place in the use of fertilizers all the world over, and to the resulting larger general demand for nitrogenous material, of which sulphate of ammonia is by far the cheapest, and express the opinion that this demand will continue to come from places not hitherto thought of. As usual, there are at the end of the pamphlet several instructive tables, some figures from which we reproduce.

Municipalization at Hull.

Judging from the local papers, the citizens of Hull are having quite a lively time just now over the proposal of the Corporation to purchase the undertaking of the East Hull Gas Company—or the Sutton, Southcoates, and Drypool Gas Company, as it used to be called. The statutory meeting of ratepayers was held last week; and a report of the arguments there adduced will be found on another page. It seems that opinions were on the occasion pretty equally divided, though the Mayor declared that there was a majority present in favour of the proposal to purchase. This the opponents did not deny; but they are taking steps to secure a more definite expression of opinion on the part of the citizens generally than it is possible to secure from a public meeting, however well attended it may be. That is to say, a poll is being demanded; and until this has been taken, the fate of the scheme—so far, that is to say, as the inhabitants have power to determine it—cannot be known. Meanwhile, it will certainly not be the fault of the newspapers if the ratepayers fail to grasp the question that is before them; for, in addition to correspondence, reports of meetings, &c., numerous special articles have appeared which put forward the facts from one point of view or the other. It must be admitted, however, that the proposal does not meet with any very great amount of favour in these articles. There appears to be an idea that the Corporation have already as much on their hands as they are able to manage efficiently, and the writer of one of the editorial comments is unkind enough, in support of this contention, to make reference to the inferior quality of the Corporation electric light supply.

More Money Wanted.

Correspondents, with more consideration than the Chairman, Directors, and Secretary of the Ticehurst and District Water and Gas Company, have forwarded to us copies of a prospectus issued by that Company inviting tenders for further capital. The prospectus is addressed to "investors in parliamentary progressive water and gas companies." After reading all the Directors can say about the Company, and ascertaining what they have not said, we have come to the conclusion that there are other "parliamentary progressive water and gas companies" for which we should have for investment purposes greater preference than that of Ticehurst. The concern is run, it is seen, from No. 99, Cannon Street, which is the address of a few other little ventures which have had about them certain demerits that have not entitled them to our support, and so they have received the opposite thing. It is also the address of the Water-Works, Lighting, and Power Investment Corporation, Limited, whose name, judging from the frequency of its appearance, seems to be indispensable in the contracts of the Companies who have birth at the offices in question. From the present prospectus inviting the subscription of further money to swell the capital account of the Ticehurst concern, the names of the Chairman and Directors are omitted. Mr. E. Eaton who was (and so we suppose is now) the Chairman, is also a Director of other concerns that have not received whole-hearted encouragement in these pages; and it is also found that the name of Mr. B. Clark, the Secretary of the Company, has done duty occasionally as representing a sub-

scriber for "one" share in certain Companies whose prospects have not appealed to us as shining. However, the Ticehurst Company now require more money. They have already spent, it would appear, £64,955—that is to say, £37,610 has been issued as ordinary share capital, and £9145 as preference shares, together with £15,200 of 4½ per cent. debenture stock, and £3000 of debenture stock, to which is attached the word "provisional," which we take to mean that the Company have exceeded their borrowing powers. Of the total capital authorized, there now only remains a balance of 1000 ordinary shares of £5 each and 171 preference shares of £5 each; so that, when these shares are issued, the capital (including debenture stock) will stand at £70,790. The Directors have been sinking money fast in this concern, seeing that it was only "incorporated by Acts of Parliament, 1902 and 1904." We wonder whether that money has been laid out economically and to the best advantage? We also wonder who have benefited most out of the expenditure—the ordinary shareholders or others?

The Shareholders' Prospects.

If we look a little farther into the prospectus, it is gathered that the revenue from gas and residuals in 1906 is "estimated" at £1721 16s., or an increase of £149 9s. 11d. over 1905, which year exhibited an increase of £237 12s. 6d. over 1904. The Company cannot afford to omit the shillings and pence. The figures show a diminution in the rate of progress; and even, if one or other of these rates of progress could be maintained, it would be a far-distant posterity who would reap anything material in the shape of dividends upon the capital expended, which expenditure, by the way, is still going on, seeing that "a comprehensive scheme for the enlargement of the Ticehurst and Wadhurst Gas-Works has been completed, and also a considerable length of new gas-mains laid." There are no figures given as to the actual revenue from water, nor as to the total consumption of gas and water, prices charged, and other bits of information useful to assist judgment. But it is "estimated" that the *total* revenue from both gas and water at the end of 1907 will be about £2300. Now investors in "Parliamentary progressive water and gas companies" will note that this is revenue and not profit. From this revenue all the working, management, and maintenance expenses have to be paid; and then to discharge the full interest on the debentures and the dividend on the preference shares already issued, we make out not far short of £1300 is required. Nothing is said as to how far the Company have satisfied their interest obligations and dividend hopes, which, of course, is not an unimportant matter in inviting fresh capital. It is said that "substantial dividends were paid by the late Ticehurst private Gas Company." That may be true; but probably in that private Company there were invested fewer shillings than there are pounds in this one. We are amused with the naive statement that "the premiums on this issue of shares, *if any*, will form part of the capital of the Company;" also that "most Sussex gas and water companies are paying good dividends," and "the shares are at a substantial premium." We are prepared to guarantee that these conditions do not apply to the Ticehurst Company; and to assert that they are not likely to for many a long year—if ever, seeing the weight of capital the concern is carrying to-day.

The Agitation at Nottingham.

Another stage has been reached in the apparently interminable controversy at Nottingham. As will be seen by the report appearing in our "Miscellaneous News," a special meeting of the City Council was held yesterday (in accordance with the arrangement come to last week), for the purpose of discussing a resolution of which Mr. A. W. Black, M.P., had given notice, to the effect that no further steps should be taken in the matter of holding an inquiry. It had previously been decided by the Council that, in the event of the President of the Local Government Board refusing to institute an inquiry himself (as he has done), and those who gave evidence before the Investigation Committee refusing to consent to their statements being printed and distributed among the councillors (as it appears they also have done), the Corporation themselves should arrange for a public inquiry. The proceedings at yesterday's meeting were of a protracted character; but, at all events, something definite was arrived at as the result of them. Mr. Black's suggestion that no further steps should be taken in the matter was not adopted; but, instead, an amendment was carried which, after some minor alterations had been made on the suggestion of the Mayor, read as follows: "That the resolution passed by the Council on Dec. 3 last, with reference to investigation into the gas undertaking, be rescinded, and that a Special Committee of five members be appointed to hold a public inquiry into the working of the gas undertaking during the past five years." The resolution here referred to is, of course, the one by which the Council agreed to institute a public inquiry with the assistance of Sir Hugh Owen or Sir Albert Rollit. Now, at any rate, the inquiry will be confined to the Council themselves; though the selection of the five members of whom the Committee is to be composed will not be made until the next meeting of the Council. The terms of the amendment—that a public inquiry shall be held into the working of the gas undertaking during the past five years—seem to offer a pretty wide scope to the investigation; and it is to be hoped that at its conclusion the ratepayers will be fully satisfied—which the remarks made at the Council meeting yesterday show is not by any means the case at present. The one thing that will, more than any other, tend to bring about this desirable state of affairs, will be the adoption of the Mayor's suggestion that care should be taken that "there should be no mystery, but the fullest possible publicity, in regard to the matter."

Trade Prosperity.

There was a great outburst of gratification last week over the record figures shown by the trade and navigation returns for the past year. It was a remarkable year for business; and the total value of the import and export trade capped for the first time 1000 millions sterling—the imports having increased by £42,900,000, and the exports by £53,200,000. This shows a remarkable spreading, and at the same time acceleration of the flow, of the tide of trade prosperity that set in a few years ago. The metal trades especially have been particularly buoyant. In the almost general prosperity, an industry supplying light, heat, and power, dealing in raw and manufactured materials as the result of residual produce, and of the magnitude of that of gas, must have had a good participation. Our friends of the electrical manufacturing industry, as distinct from the electricity supply industry, are not at all well pleased with the position they occupy in the returns. Among the items of export, "electrical goods and apparatus" is the only one that exhibits a decrease; and, considering the advance there has been in the price of metals, the monetary decrease does not fully represent the actual decline. On the other hand, the imports of electrical goods have advanced by £177,000. The decrease under the one head, and the increase under the other, rather give support to those who have seen cause to urge the electrical manufacturing industry of the country to "wake up" and take a larger part in initiative work, instead of being content to slavishly follow where others lead.

The Funds of the Labour Representation Committee.

In the early part of last year, a County Court case was tried in Monmouthshire, which was brought for the purpose of testing the legality of Trade Unions making levies for the return and maintenance of Labour Members of Parliament. The defendants in the action were the South Wales Miners' Federation, of which organization the plaintiff—a miner by occupation—was a member. The action was to recover 4s. alleged to have been illegally demanded; and an injunction was asked for to restrain defendants from making similar levies in future, as well as a declaration that the Parliamentary Levy Rule was illegal. The plaintiff was entirely unsuccessful; and in recording the judgment at the time, we remarked that, unless this finding was reversed on appeal, the plaintiff would have to choose between the alternatives of paying the levy or of ceasing to be a member of the Miners' Federation. In this, however, we were mistaken, for the subsequent action of the Federation in compelling the colliery owners, under threat of striking, to employ none but Union men, left the plaintiff (if he lost his appeal) practically no alternative whatever—if he wished to continue his work in that part of the world as a miner. Last week the appeal came before the King's Bench Division (the claim for the return of the 4s., however, being dropped, owing to the finding of the County Court Judge that the money had been paid voluntarily), and was dismissed; so that now the plaintiff is in the position of having to contribute towards the support of a Member

of Parliament with whose political views he is not in accord. It has been strongly urged by the leaders of the Federation that it is for the good of the men to join the organization; but this case is a very clear illustration of the unfairness of compelling anyone to become a member of it against his will. The argument raised for the plaintiff at the appeal was that the definition of a Trade Union contained in the Act did not give any power to raise a levy for the purpose of the election and maintenance of Members of Parliament; but for the defence it was contended that, under the rules, there was ample provision for making the levy, and that, by taking a ballot of the members under the rules, everything possible had been done to observe them. In the course of his judgment (with which Mr. Justice Phillimore concurred), Mr. Justice Darling pointed out that, though the levying of a rate for the purpose referred to was not specified in the objects of the Union, neither was a levy for a benefit fund; and he thought both were permissible. He said that what the Court were asked to do was to interfere in the internal administration of the Association—and to interfere where all the members had been consulted. This they declined to do. Referring to the most interesting aspect of the case—that the plaintiff would be compelled to contribute to the support of a Member with whose politics he did not agree—Mr. Justice Darling remarked that the rule provided that the representative in Parliament "should press forward proposals conducive to the general welfare of the Association," which could be done whatever his politics might be. There may be some consolation to the plaintiff in this reflection; but there would be a good deal more if he could feel that he need remain a member of the Federation only so long as he chose of his own free will to do so. It is the loss of individual freedom of action that makes the whole matter so unsatisfactory. Probably, however, the last has not yet been heard of the case, inasmuch as plaintiff's Counsel asked for, and obtained, leave to further appeal against the judgment in the King's Bench Division.

Engineering and Machinery Exhibition.—It is announced that arrangements are being made for the holding of another Engineering and Machinery Exhibition at Olympia, from Sept. 19 to Oct. 19 next. It is anticipated that the display will be more extensive than the one held last year. Lord Armstrong and Lord Kelvin are among the patrons.

Scottish Junior Gas Association.—The quarterly meeting of the Eastern Division of the Association will be held in the Heriot-Watt College, Edinburgh, next Saturday afternoon, when two papers will be read—one by Mr. John J. Wight, on "Suction Gas Producers," and the other by Mr. Henry Rule, on "Stoking Machinery in Use at Falkirk."

The Chester Workhouse Water Supply Case.—In the "JOURNAL" for the 1st inst. (p. 42), we reported the proceedings in this case, which raised the question whether the Guardians of the Chester Union were entitled to a supply of water for their workhouse at the rate charged by the Chester Water Company for domestic purposes. The action was tried by Mr. Justice Jelf, whose reserved judgment was delivered yesterday in favour of the plaintiffs. A report will be given next week.

A New Electric Light.—According to the New York Correspondent of "The Tribune," Professor Parker, of the Columbia University, has invented an incandescent light which he hopes will revolutionize electric lighting. He declares that its efficiency is 45 times as great as that of an ordinary lamp fitted with carbon filament. Its special feature is a new filament, called helion, because its spectrum is similar to that of helium. In the tests which have been made, the new light burnt steadily from 485 to 1270 hours, with an average of 1000 hours, and it gives a white flame. Mr. Parker says it will last twice as long as a carbon filament lamp, besides carrying a large overload of electricity without breaking. A similar statement to the foregoing reached London yesterday through Laffan's Agency.

Allowable Pressures on Deep Foundations.—Data on allowable pressures on deep foundations, recently collected and analyzed by Mr. E. L. Corthell, show that the pressure of stable structures on the material on which they are founded ranges between the following limits: On hard clay, between 4000 lbs. and 16,000 lbs. averaging 10,160 lbs. in sixteen examples. On hard pan, between 6000 lbs. and 24,000 lbs., averaging 17,400 lbs. in five examples. These cases do not show any settlement. Settlement took place in fine sand, with a minimum load of 3600 lbs., a maximum load of 14,000 lbs., and an average load of 10,400 lbs. In clay—principally London clay—in five examples the pressure ranged between 9000 lbs. and 11,200 lbs., averaging 10,400 lbs. In silt and alluvium, two cases of settlement were reported with loads of 3200 lbs. and 15,200 lbs.—a wide variation. Three cases of failure on a mixture of sand and clay are given; the pressures ranging between 3200 lbs. and 14,800 lbs., averaging 6600 lbs. This should be compared with the average of 9800 lbs. and the range of 5000 lbs. to 17,000 lbs. in ten examples, already referred to, in which no settlement occurred.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 172.)

THE attitude of things in general on the Stock Exchange last week partook largely of the features which characterized the movements of the previous week. The opening was buoyant, and almost enthusiastic, as if everything was bound to rise like a balloon. But the rise was not a high one. After a little, it stopped; and the machine began to come down again. Less sanguine views then prevailed, and, later on, some tinge of despondency. Uncomfortable forebodings as to rates of contango were a flattening factor; but by the close, there was some recovery. Sensational incidents—such as smart coups in Siberian adventures—are not within our province. The Money Market opened with a fairly easy tendency; but soon, under the influence of gold movements, it stiffened materially, and this state of things continued to the close. Business in the Gas Market was well up to the mark in point of volume, taking the aggregate of transactions; but the distribution through the list was more than ordinarily uneven. There were not many changes in quotation, and they were inconsiderable in magnitude. The general tone in the London market, however, was good. The only exceptions came from the Provincial Exchanges, where two of the leading and the choicest issues had a set-back. In Gaslight and Coke issues, the ordinary was extremely active and buoyant. The opening bargain was at par (which had not been touched for some weeks); and though 99½ was afterwards marked, the price steadily rose from that to 101¾, at which figures the concluding bargain was done. The quotation had advanced a point; but for some reason (or none at all), half of this was knocked off on Saturday. The secured issues also were busier. The maximum changed hands at from 89¼ to 89¾; the preference at from 107⅞ to 108½; and the debenture at from 84½ to 86. South Metropolitan was rather quiet, and not disposed to rise. The dealings marked were all between 128 and 129. The debenture was done at 85½ and 85¾. Hardly anything was done in Commercials; one bargain in the 4 per cent. at 111 being all the business marked. The Suburban and Provincial group was at about its usual low pressure. Alliance old was done at 21⅜, Bournemouth "B" at 17 special, Brentford old at 264, British at 42⅛ and 42¾, South Suburban at 124, ditto debenture at 130, and West Ham at 104. On the local Exchanges, Liverpool "A" fell 2, and Newcastle another ½. Business was moderate in the Continental Companies. Imperial opened at 177½, and worked up to 179⅝ (a rise of ⅛ in the quotation); but neither Union nor European had any dealings in them. Among the undertakings of the remoter world, Bombay old was done at 6 15/16 and 7 (a rise of ¼ in the quotation), ditto new at 5⅛ free, Buenos Ayres at 11⅝, Cape Town preference at 9¼, Hongkong at 19¾, Primitiva at from 7 3/16 to 7¾ (a rise of ¼), ditto preference at 5 15/16, ditto debenture at 95½, River Plate at 12⅜ and 12 9/16, ditto debenture at 95⅛ and 96⅛, Monte Video at 12⅞, and San Paulo debenture at 49¾. Ottoman rose ¼.

The closing prices are shown in our Stock and Share List on page 172.

ELECTRIC LIGHTING MEMORANDA.

A New Electrical Contemporary—Mr. Solomon on Old Lamps and New—The Electrical Delinquencies in Oxford Street—Electrical Fires—Unrealized Hopes.

WELCOME is to be given to another electrical contemporary—"Electrical Engineering." Extraordinary competition is a salient feature of the electrical industry; and the competition in its electrical literature has become so severe that friends may fear for the existence of certain of the papers as commercial successes. But that is no business of ours. Welcome is accorded to the new venture for the sound character of the original articles that appear in the first two issues, all of which are readable and instructive, and show a wise selection on the part of the Editor, and an influence in obtaining good material. If the standard set at the opening of its career is adhered to, we shall hope that the newcomer will not be among the least successful of the technical papers that so worthily (if occasionally extravagant in statement) fulfil an important duty in the great competing industry.

In the first number of our new contemporary, is an article by Mr. Maurice Solomon, under the title line of "Progress in Incandescent Lamps." The picture of "progress" that Mr. Solomon, in his great wisdom, draws is not one calculated to cause the springs of hope in the breasts of electricians to rise above the normal low condition of some years past. Mr. Solomon confirms what other observers have noted, that the work on the metallic filament lamps, though it has not all been a mistake, has, like the lamps themselves, its limitations in usefulness; and that the limitations of the lamps that have resulted from the work will cause them to be of comparatively small value to the electrical industry of this country. We have seen in another quarter, the deficiencies, uncertainties, and vagaries of the Nernst and the Tantalum lamps paraded in all their nakedness; and now Mr. Solomon, "taking everything into consideration" (which is a very proper thing to do) says "there is every probability that the metallic filament lamp will play an important part in the development of electric lighting, though it is doubtful whether it will

seriously disturb the carbon lamp for some time to come, except perhaps by gradually restricting carbon lamps to high voltages. An examination of the whole subject leads to the conclusion that the attempts at improvement by finding materials capable of withstanding high temperatures, have almost reached their limit. In every direction, progress seems blocked by limiting temperatures. They limit the efficiency of the high-voltage carbon lamp, and the voltage of the metallic filament lamp. Those who wish to make further progress must turn their attention to another field, and seek to produce light efficiently otherwise than by raising the temperature of a solid body." As Mr. Solomon has taken "everything into consideration," has made "an examination of the whole subject" and "in every direction," we must perforce bow to his conclusion.

Mr. Solomon does not regard the old carbon filament lamps as being bad things on the whole. Their all-round serviceability is an important point in their favour, which cannot be set aside by the greater and undisputed efficiency of the metallic filament lamps, on which alone they base their claims to popular favour. But that is not sufficient. In the first place, there is the Nernst lamp; and respecting it our present author says that, with its complicated preheating mechanism, it can hardly be said even now to represent more than an intermediate step in the evolution of a really commercial high-efficiency lamp. In any case, this complication must always militate against its popularity. Apart from the obvious disadvantages for many purposes of the slow lighting up, the existence of mechanism always liable to get out of order, and requiring technical supervision for its maintenance in an efficient condition, is a powerful deterrent to the use of the lamp. And these are not the only drawbacks that have been divulged by more extended use. Then as to the Osmium lamp, the brittleness of the filament is a considerable drawback, and has hindered the success of the lamp. Besides which, the high conductivity gives rise to the difficulty common to all metallic filament lamps, that they can only be used for low voltages. As to the Tantalum lamps, Mr. Solomon states that recent tests of these show an average life of nearly 2000 hours, at an average power consumption of 1·8 watts per candle. The Wolfram, the Osram, and the Osmin lamps all claim much—a consumption of about 1 watt per candle, and a life of 1000 to 3000 hours. But, as the author says, no independent tests are available from which to form any satisfactory estimate of their possibilities. Anyway, this we do know, that the low voltages with which they can only be employed will not induce any large popularity in this country. Metallized carbon filament lamps, as developed in America, are said to have as long a life as the ordinary carbon filament lamp, but are capable of being run at 2·5 watts per candle. The reduction in the resistance of the filament is obviously a move in the wrong direction. Mr. Solomon wisely acknowledges the difficult task of the electrical engineer in having to compete in cost with the incandescent gas-light. Of course, the successful introduction of such lamps as the Tantalum or the Wolfram might be expected to lead to considerable further development of the electric light; but Mr. Solomon admits that it would be premature to say this was already in sight. Such caution is admirable. We cannot, however, agree with him that one need not feel concerned about the initial cost of the lamps, as knowledge of what householders will not do in the way of providing expensive fittings decidedly leads one to a totally different conclusion. However, the great drawback to the metallic filament lamp is the difficulty of making it for high voltages; and unless this can be overcome, it will be very hard for the metal filament to displace the carbon filament in this country, and for the carbon filament to displace gas mantles. The Editor of our new contemporary, it may be inferred, coincides with this view, inasmuch as he observes: "There is no reason why sub-stations supplying small outlying areas should not now be designed for a secondary voltage of 110, so that the consumers may profit by the new high-efficiency lamps that are obtainable." If the new lamps are going to be chiefly useful for small outlying districts, we are content to leave the matter where it is for the present.

Many shopkeepers in Oxford Street and certain other choice parts of the Borough of Marylebone have been made sadder but wiser by the sore chastening that they have had through putting their whole trust in electricity for lighting purposes. In about a fortnight, just at eventide when the Christmas and New Year's business was proceeding in a manner to make the tradesman's heart rejoice, there were two failures of the electric light—each time lasting about twenty minutes—the causes of the accidents being of a character to which, so the Chairman of the Marylebone Electricity Committee will aver, electricity plant is very susceptible. It was not intended to refer to the matter again this week, but we are constrained to take the earliest opportunity of endorsing the view of an electrical contemporary that "twenty minutes' darkness means a serious risk to some of the shops, jewellers' and drapers' especially," and that "it is high time something was done to prevent repetition of this kind of thing." But what is to be done? We read in a note, in another electrical contemporary, referring to the Borough Council's new station, that "no reasonable precautions to ensure continuity of supply have been neglected." Still the failures! There has been some smart work in restoring gas-fittings, and in providing for emergencies, in the Marylebone and South Metropolitan electricity supply districts; and lamp, oil, and candle dealers have likewise reaped a good harvest.

Electricians continue to protest that there is nothing so safe as electricity for lighting. In one electrical contemporary, we see it freely acknowledged for the first time that the large fire at a South London drapery establishment, which did damage to the extent of £30,000, was due to an assistant making some alterations or adjustments in connection with a hanging lamp in the shop window, and that the flexible cord on which the lamp was suspended caught fire, and communicated the fire to the inflammable material near by. Flexible conductors drop in for some pretty severe condemnation as the weakest part of an electric light installation. Each of these conductors consists of 40 wires or more, 0·0076 inch diameter—this small size being chosen for the sake of flexibility. The insulation of these wires gets rubbed off; and our contemporary is of opinion that it speaks well for the protection afforded by the fuses that fires are not more frequent. Perhaps they are more frequent than the writer of the article believes to be true—or will acknowledge. In the same article, consumers are exhorted to avoid kinks in their wires; it would have been to the advantage of many consumers if they had avoided the wires altogether. The writer goes on to remark that he regrets to say "it is not the consumer only who needs to be cautioned;" and the wiring contractor is then brought into it. After the accusation against flexible wires, and the cautioning of contractors, the writer makes this really philosophic statement: "Although frequently accused of causing fires of which the true cause is untraceable, it is certain that electric lighting is rarely the actual source." There is a kink in this flexible sentence. If the "true cause is untraceable," how can there be any certainty that "electric lighting is rarely the actual source?" Probably it is in the untraceableness of the work of electricity in causing conflagrations that it has its greatest protection. While there is cautioning of the electrical contractors, these gentlemen bemoan their fate in having to please so many people. Nearly every Fire Office has its own rules for electric installations; nearly every station engineer issues rules which he cannot enforce; consumers have their own fancies; and architects their little foibles. So between them all, the lot of the honest electrical contractor is not a happy one. We have asked before, why there should be all this necessity for rule and regulation, if electricity is that angelic, tractable something of which we read in the Electrical Press. In the Daily Press we are told of fires being caused by the fusion of electricity wires, reports to the same effect are given by expert fire authorities, we read of railway carriages catching fire in the "Tubes," and we learn, to take the latest fatality, of the death of an electrician at Chester through a switchboard suddenly becoming enveloped in flame. But all the same, we are asked to believe that electricity is innocent of harm. Cynical Carlyle believed that the population of the world were mostly fools; the writers in the Electrical Press are apparently in full accord with him.

Some years ago, when Parliament was engaged in carving up the country among the Electricity Power Companies, it was remarked in the "JOURNAL" that there ought to be a staying of the hand in the defence of the investing public, until one or two pioneer companies had proved themselves. Parliament continued in indolent fashion to accept the prophecies of the company promoters as absolute fact. The companies were floated; the public were induced by specious prospectuses to put their money into these concerns; and to-day the shareholders find, in more than one notable case, that they are part proprietors of white elephants. Complete disaster has just overtaken the South Wales Electrical Power Distribution Company. It has been threatening for some months past. The exaggerated prospects of business that were held forth, and which produced the sanguine expectations of good profit on investment, have been proved baseless by the expenditure of £899,006 of shareholders' and unpaid creditors' money. After reading the long "tale of woe" told by Mr. Stanley Boulter at a meeting of the debenture holders of the Company yesterday week, there is no getting away from the fact that the end has now come. Not only has the considerable sum of money named been virtually lost, but such few large consumers as the Company have had are fitting up private plants of their own; and do what they will, the Company can only get guarantees of business to an amount not one-third of what they must have to enable them to maintain a bare living existence. The consternation there was among the central station people when the Company advertised supplies to the ordinary consumer at ¾d. per unit is now remembered as a humorous incident in the chequered career of the Company. But the noise of the big drum has ceased; the best part of a million of money has been swallowed up; men have lost more than they could afford to lose; and the debenture holders are looking to rescuing all they can for themselves from the terrible waste. Again, an article which appeared in the "Manchester Evening News" a few days ago on the subject of "Electrical Progress in Lancashire" shows that there hopes have not been realized—that in every direction the advance is a tardy one. And this in industrial Lancashire!

We are glad to announce that the satisfactory progress of Mr. Norton H. Humphrys towards recovery from his recent serious illness, which we were able to report last week, has resulted in convalescence. Mr. Humphrys has now left Salisbury for a change, but hopes to resume his duties before the end of the month. He asks us to express to his friends his thanks for their sympathy, which greatly cheered him in the critical time through which he has passed.

NEW ACTS AFFECTING INDUSTRY.

A Glance at their Provisions.

A FORTNIGHT ago, in our editorial columns, reference was made to the various Acts that were passed last year affecting labour and industry; and consequently of labour and administration in the gas industry. In the "Miscellaneous News" last week (p. 103), the provisions of one of the measures—the Notices of Accidents Act—were brought under notice. The Trades Disputes Act, the Workmen's Compensation Act, and the Census of Production Act have also now been published; and it may be useful to readers if we make a general survey of their provisions, without particularly commenting on them. There has been comment in abundance over these Acts during their evolution, both in Parliament and in the Press; and nothing can now change any oppressive or inequitable condition or privilege in one or other of the measures excepting by the amending power of Parliament itself. They must, therefore, be accepted as they stand as part of the law of the land.

Trades Disputes Act.—Measured by length this Act is not a formidable one; measured by substance, it is most harmful. It is the product of the labour and socialistic representatives in Parliament, assisted by a Government whom the wire-pullers in this matter found pliable to an undignified degree. On all points, the Government yielded to demand, with the result that trades unionism and trades union tactics have now a legalized liberty never before enjoyed. At the outset, there is a new paragraph added to the first part of section 3 of the Conspiracy and Protection of Property Act, 1875, which enacts that "an act done in pursuance of an agreement or combination by two or more persons shall, if done in contemplation or furtherance of a trade dispute, not be actionable unless the act, if done without any such agreement or combination, would be actionable." Then we have countenance given to "peaceful picketing"—this being an elastic term which can be stretched according to the consciences of those engaged in it. It is now pronounced lawful for one or more persons acting on their own behalf, or on behalf of a trade union, or of an individual employer or firm, in contemplation or furtherance of a trade dispute, to attend at or near a house or place where a person resides, or works, or carries on business, or happens to be, if they so attend merely for the purpose of peacefully obtaining or communicating information, or of peacefully persuading any person to work or abstain from working. Thus it will be seen that, prior to and in times of dispute, no one who is peacefully working, and desires to continue to so work, for an employer, will be immune, in any place, not even in his own home, from the unwelcome attentions of those engaged in a prospective or present dispute. Then there is a section that has the effect of repealing a large part of section 7 of the Conspiracy and Protection of Property Act, 1875. It removes the liability for interfering with another person's business, by providing that an act done by a person, in contemplation or furtherance of a trade dispute, shall not be actionable on the ground only that it induces some other person to break a contract of employment, or that it is an interference with the trade, business, or employment of some other person, or with the right of some other person to dispose of his capital or his labour as he wills. This clearing of the path of trade unionists, and their protection against legal proceedings, continue in a clause which completely prohibits actions of tort against trade unions. It provides that an action against a trade union, whether of workmen or masters, or against any members or officials thereof on behalf of themselves, and all other members of the union in respect of any tortious act alleged to have been committed by, or on behalf of the trade union, *shall not be entertained by any court.* Nothing in the section, however, will affect the liability of a trade union to be sued in the events provided for by the Trades Union Act, 1871, section 9, except—and this is the important part of this provision—in respect of any tortious act committed by, or on behalf of, the union in contemplation or in furtherance of a trade dispute. The insertion in the clause of the words "or masters" suggests that the union of employers for defensive purposes will have to become a more common feature than hitherto of our industrial life. Another effect of the Act will, without doubt, be the broadening of the breach between employees and capital.

Workmen's Compensation Act.—This Act is of considerable length; and its great scope is ascertained by first referring to its latter part to obtain the definition of "workman." It is found that the term—

> "Workman" does not include any person employed otherwise than by way of manual labour whose remuneration exceeds £250 a year, or a person whose employment is of a casual nature, and who is employed otherwise than for the purposes of the employer's trade or business, or a member of a police force, or an outworker, or a member of the employer's family dwelling in his house; but, save as aforesaid, means any person who has entered into, or works under, a contract of service or apprenticeship with an employer, whether by way of manual labour, clerical work, or otherwise, and whether the contract is expressed or implied, is oral or in writing.

Therefore the term "workman" includes all employees, save those receiving more than £250 a year and whose occupation is other than manual, and members of a police force, an outworker, or a member of an employer's family dwelling in his house. It is necessary also to ascertain the interpretation of an "outworker." It is a person to whom work is given for execution in his own home or on other premises not under the control or management of the employer. But in connection with this, it is clear that the workers in premises in the districts of (say) gas-supplying companies and local authorities cannot be described as "outworkers," for "the exercise and performance of the powers and duties of a local or other public authority shall, for the purposes of this Act, be treated as the trade and business of the authority."

We have seen by the foregoing how thoroughly—with few exceptions—the Act (which by-the-by comes into operation on July 1 next) enfolds all kinds of labour. As to the far-reaching character of the liability for personal injury by accident arising out of employment, this is best impressed by noting what little exemption margin is allowed. An employer will not be liable under the Act in respect of any injury which does not disable the workman for a period of at least one week from earning full wages at the work at which he was employed; and, furthermore, if it is proved that the injury to a workman is attributable to the serious and wilful misconduct of that workman, any compensation claimed, in respect of that injury, shall, unless the injury results in death or serious and permanent disablement, be disallowed. Those are the only exemptions; and the gross unfairness of the last one is all too palpable. A workman may be guilty of "serious and wilful misconduct." If that conduct does not kill him or seriously or permanently disable him, the employer is not to compensate him; but if the man's "serious or wilful misconduct" causes his death or seriously or permanently disables him, the employer is liable under the Act. It is also well for employers to note that, when the injury is caused by the personal negligence or wilful act of the employer, or of some person for whose act or default the employer is responsible, nothing in the Act is to affect any civil liability of the employer; but, in this case, the workman may, at his option, either claim compensation under the Act, or take proceedings independently of it. The employer, however, is not to be liable to pay compensation for injury to a workman by accident arising out of, and in the course of, the employment, both independently of, and also under, the Act, except in case of personal negligence or wilful act. If any question arises as to compensation, and cannot be composed by agreement, then provision is made for the manner of settlement by arbitration. If, too, action is taken to recover damages independently of the Act, and the Court holds that the injury is not one for which the employer is liable in such action, but that he would have been liable to pay compensation under the present Act, the action is to be dismissed. But the Court is, if the plaintiff so chooses, to assess the compensation, deducting the costs which, in its judgment, were caused by the plaintiff bringing the action, instead of proceeding under the Act. Again, proceedings for the recovery of compensation will not be maintainable, unless notice of an accident has been given as soon as practicable after the accident, and before the workman has voluntarily left the employment in which he was injured, and unless the claim for compensation is made within six months from the occurrence of the accident causing the injury, or, in case of death, within six months from the time of death. In this connection, there are protective clauses, bearing upon want of, or defect and inaccuracy in, notices, through mistake, absence from the United Kingdom, or other reasonable cause. Directions as to giving notice are included.

There are considerable regulations regarding contracting out, which are well worth pausing over. If a Registrar of Friendly Societies, after taking steps to ascertain the views of the employer and workmen, certifies that any scheme of compensation, benefit, or insurance for the workmen of an employer in any employment, provides scales of compensation not less favourable to the workmen and their dependants than the corresponding scales contained in the Act, and that, where the scheme provides for contributions by the workmen, the scheme confers benefits at least equivalent to those contributions, in addition to the benefits to which the workmen might have been entitled under the Act, and that a majority (ascertained by ballot) of the workmen to whom the scheme is applicable are in favour of the scheme, the employer may, while the certificate is in force, contract with any of his workmen for the provisions of the scheme to be substituted for the provisions of the Act. Thereupon, the employer will only be liable in accordance with the scheme. Certificates will expire at the end of limited periods of not less than five years, but may from time to time be renewed, with or without modifications. It is important that employers should notice that no scheme will be certified which contains an obligation upon the workmen to join it as a condition of their hiring, or which does not contain provisions enabling a workman to withdraw from it. Provisions are made for the revoking of certificates on the Registrar being satisfied that the conditions of a scheme do not continue to comply with the requirements of the Act.

There is a most important section referring to sub-contracting, which will make it necessary for those entering into, and undertaking, contracts to ascertain their precise position. By it any person (referred to as the principal) who, in the course of his trade or business, contracts with any other person for the whole or any part of work undertaken by him, the principal is to be liable to pay to any workman engaged in the execution of the work any compensation under the Act which he would have been liable to pay if the workman had been immediately employed by him. But a principal may be indemnified by any person who would have been liable to pay compensation to an injured workman

independently of this section. Nothing, too, is to prevent a workman recovering compensation from the contractor instead of the principal. And, furthermore, the principal is protected by a provision which frees him from liability in any case where the accident occurs elsewhere than on, or in, or at the premises on which the principal has undertaken to execute the work, or which are otherwise under his control or management.

There are a number of provisions dealing with cases in which the bankruptcy of an employer is involved; and a section provides for remedies against both employer and stranger, though the workman will not be entitled to recover both compensation and damages. The Act applies to half-a-dozen industrial diseases mentioned in a schedule; the one which has the nearest interest for the gas industry being lead poisoning or its sequelæ.

Among the schedules to the Act is one giving, in extended form, the scale and conditions of compensation, and a second sets out the rules affecting arbitration.

Census of Production Act.—This is an Act that provides for a census of production being taken in 1908, and subsequently at such intervals as may be determined by an order made by the Board of Trade as soon as practicable after the taking of the first census. The census will be under the superintendence of the Board of Trade, who will issue such forms and instructions as they may deem necessary; the expenses incurred being paid out of money provided by Parliament. The particulars will be required in respect of the calendar year next preceding the date of the census, or any part of the year as may be prescribed; and their nature will be as to the trade or business, output, number of days on which work was carried on, number of persons employed, power used or generated, and matters of a like nature (except the amount of wages) as may be found to be necessary for the purpose of enabling the quantity and value of production to be ascertained. Manufacturers and contractors where subject to competition will regard with thankfulness the condition that no individual return, or part of one, will, without the previous consent of the owner of the undertaking, be published, except for the purposes of a prosecution under the Act; and persons engaged in the census are to make a declaration not to disclose or use, except for the purposes of the Act, any part of a return. Contravention will be a misdemeanour; and, on conviction, any guilty person will be liable to imprisonment, with or without hard labour, for a term not exceeding two years, or to a fine, or to both. On the other hand, persons refusing or neglecting to fill up a form, or who make a false return, will be liable, on conviction, to a fine not exceeding £10, and in the case of a continuing offence to a further fine not exceeding £5 for each day during which the offence continues. The exercise or performance by a local or other public authority of the powers of that authority is to be treated as trade and business. In addition, from the schedule, it is remarked that, among the persons who will be required to make returns are the occupiers of every factory or workshop within the meaning of the Factory and Workshop Act, 1901; the owners, agents, and managers of mines and quarries; builders undertaking the construction or alteration of a building, or any part of it; every person executing, by way of trade or business, works of construction, including embankments, reservoirs, or wells, or laying or altering gas or water pipes, electric lines, and other prescribed work; and every person carrying on any other trade or business which may be prescribed.

Truly, the burdens of industry are increasing!

Competition for a Road-Tarring Machine.

The Roads Improvement Association, acting on behalf of the Automobile Club and the Motor Union of Great Britain and Ireland, have issued the rules for a competition to decide the best means of mechanically spreading tar upon road surfaces in such a manner that it will bind the materials together and not merely form a coating. The merits of the competing appliances will be judged entirely by the results of the operation; the chief consideration being the efficiency with which the tar penetrates the road and the cost of application. Tarring has, so far, proved superior to any palliative for laying dust; but the method of application by hand is expensive. It involves the use of an excessive quantity of tar, and the creation of mud and a small amount of dust of an objectionable character. It is necessary to so far reduce the cost and increase the efficiency that the treatment may be applied to all the principal roads throughout the country. Efforts to induce manufacturers of municipal appliances to design and submit an apparatus for trial not having proved successful, a suggestion was made to the Motor Union by a leading county surveyor that automobilists should organize a competition for an apparatus that will spray the tar under such pressure as would enable it to penetrate deeply into the road, reduce the waste of tar, and require the minimum of unskilled labour. The Judges appointed by the Council of the Roads Improvement Association to determine the comparative merits of the competing appliances include seven representatives of the Automobile Club, the Motor Union, and the Roads Improvement Association, and five leading City and County Engineers, appointed after consultation with the Incorporated Association of Municipal and County Engineers —*i.e.*, the City Engineers of Liverpool and Birmingham, and the County Surveyors of Middlesex, Hampshire, and Kent—the gentleman occupying the last-named position being Mr. H. P. Maybury, M.Inst.C.E., who was formerly Gas Manager to the Malvern Urban District Council.

POSITION OF ENGLISH COMPANIES IN FRANCE.

In the course of last week, attention was called by the London Chamber of Commerce to an important Bill affecting foreign companies trading in France, which has been deposited by the Government in the Chamber of Deputies. A special meeting was called to consider what representations should be made on the subject to the Secretary for Foreign Affairs; and the interest taken in the matter was evidenced by the good attendance. The chair was occupied by Mr. Charles Charleton, the President of the Council of the Chamber, who explained that the measure had been brought forward in consequence of certain legislation contemplated with reference to French companies; and if it passed, an English company establishing itself in France would have to register in such a way that a tax of ¼ per cent. would be levied not merely upon the proportion of the capital represented in the country, but upon the whole of it. Among the other obligations imposed were these—that a certified translation of the whole of the Articles of Association would have to be registered and deposited, together with a description of the undertaking and its objects, and a statement of the remuneration of the directors and managers, and a full balance-sheet would also have to be registered. Mr. Charleton explained that the meeting had been convened without the slightest feeling of hostility; the sole desire being to put the position of English companies clearly before the French Government, and request that they might not be forced to withdraw from the country, as many would have to do if the Bill became law.

In the course of the discussion, Mr. J. Prinsep, representing certain mining undertakings having a capital of about £10,000,000, pointed out that the proposed tax would fall very heavily—to the extent of £25,000—upon them, apart from the additional imposts in the shape of fees, stamps, and demands on the issues of new capital. He said he had been advised that many of the leading French bankers had expressed themselves to their Government as opposed to the measure, as being likely to hamper the operations of English companies in Paris. French companies in England were not subjected to any such extra taxation; and he claimed that there should be equality of treatment in the two countries. Mr. Frank Debenham thought the Bill was levelled at French companies registered under the English Companies Acts. The Chairman said he had heard that there was no intention to press the Bill; but it was necessary to guard against the danger of its passing. Sir Samuel Boulton (Messrs. Burt, Boulton, and Haywood, Limited) remarked that, during half-a-century of business in France, his Company had nothing, even in times of political excitement, but the most pleasing experiences in their relations with Frenchmen. He did not think there was on the part of the French Government any feeling against English manufacturers and merchants in France; and the suggestion that a company having a capital of a million sterling, but employing only £10,000 in the country, should pay a tax of ¼ per cent. upon the whole of the capital, would, in his opinion, be ridiculous and prohibitive. The outcome of the meeting was the passing of a resolution expressing the opinion that a deputation from the Chamber should wait upon the Foreign Office, in order that the necessary representations should be made to the French Government to secure that the new legislation (if any) should be drafted on lines that would not weigh unduly on companies represented in both countries.

The decision was a good one as a measure of precaution; because, though, as suggested by some of the speakers, there may be no intention on the part of the Government to hamper English enterprise in France, the Bill will affect English companies—and, of course, gas companies—carrying on operations in that country, inasmuch as it will put all foreign undertakings on the same footing as those that are indigenous, which have to bear a registration duty of ¼ per cent. on their total capital. The Bill aims at the restriction of undesirable foreign companies, of which a large and increasing number have been formed of late years to carry on operations in France; and, moreover, it embodies a means of raising money for revenue purposes. The proprietors of French undertakings—notably those connected with insurance—have been complaining loudly of the unfair competition in their own country of foreign undertakings which are free from the burden of registration duty; and the Government appear to have taken advantage of this dissatisfaction to introduce their Bill. Though it is not specifically stated therein that a registration duty will be imposed upon foreign undertakings, it stipulates that their status is to be assimilated to that of native traders; and as these have all to pay the duty, it follows that foreign undertakings will have to do the same. That this will be a serious matter for English companies having branch establishments in France, is obvious; and therefore we shall await with interest the result of the action of the Chamber of Commerce. Should this, or any representations that may be made to the Government official in charge of the Bill, be unsuccessful in preventing an enactment which will be manifestly unfair to English companies, the only course for the latter to take will be to convert their branch establishments into separate French companies, in which case the registration duty will be payable on only the portion of the capital engaged in the French business.

In connection with the subject under consideration, attention may be called to a letter which appears in our "Miscellaneous News" to-day.

GAS PROVISIONAL ORDERS FOR 1907.

THIRD ARTICLE.

UNDER the Gas and Water Facilities Act, 1870, applications to the Board of Trade for powers have been made by a few Gas Companies; and the objects in view may be briefly reviewed.

To enable them to raise additional capital and for other purposes, the Freshwater Gas Company are applying to the Board of Trade for a new Order. The further capital powers proposed are not to exceed £13,000, including premiums; and the limitation of the capital in the whole is to be £25,000, until the Company receive authority to raise further money. On issues as ordinary capital, the maximum dividend is 10 per cent.; and on issues as preference capital, the dividend is not to exceed 6 per cent. The borrowing powers sought are equal to one-fourth the total amount of the capital; and on issues no higher rate of interest than 5 per cent. is to be paid.

The New Tredegar Gas and Water Company, Limited, are seeking to extend their capital powers by an amount of £7500, including premiums on the sale. The whole capital is then not to exceed £12,250. The dividend is limited to 7 per cent. on that part of the additional capital issued as ordinary and 6 per cent. on preference capital. The borrowing powers, it is proposed to restrict to one-fourth of the capital; the highest rate of interest payable being 5 per cent. The part relating to the water undertaking will be dealt with later. The remaining clauses mainly give direction as to the issue of the new capital. [*Parliamentary Agents: Messrs. R. W. Cooper and Sons.*]

The Seaford Gas Company, Limited, are desirous of being invested with several new powers. First with respect to money, they ask that their capital powers may be extended to £54,000, including £41,000 of 10 per cent. original capital and £13,000 of 7 per cent. additional capital. It is requested that borrowing powers be allowed to the extent of one-third of the issued capital. The applicants are contemplating a renewal fund. In addition to lands described in a schedule, the Company propose powers of purchase by agreement up to 3 acres. The illuminating power of gas is to be 14 candles, the price of which is not to exceed 5s. per 1000 cubic feet. The model prepayment clauses are adopted. The promoters are taking power, if they think fit, to allow discounts to consumers up to 10 per cent. for prompt payment, and 15 per cent. for large consumption. Testing clauses provide for the use of the Metropolitan argand burner No. 2, a bar photometer, and Harcourt's ten-candle pentane lamp; but provision is being made for the undertakers and the District Council agreeing, if at any time they think fit, upon any regulation with reference to the testing of gas, in addition to, or in substitution for, the provisions contained in the Order. The Order embraces a purchase clause in favour of the District Council, operative for five years.

Another purely money application is that of the Skegness Gaslight and Coke Company, Limited. They are asking for an additional £15,000, with the limitation of the whole share capital to £26,000. On the new capital the dividends are to be limited to 7 per cent. on ordinary capital and 5 per cent. on preference capital. The borrowing powers are not at any time to exceed in the whole the amount limited by section 15 of the Company's Order of 1902, and one-third of the amount of the capital raised under the new Order. Interest is to be limited to 5 per cent.

Further money powers are likewise required by the Twyford (Berks) Consumers' Gas Company, Limited. Of the intended limitation of the share capital—£19,300—the proposed additional capital is £15,000. The maximum dividend on the original share capital of £4300 is 10 per cent.; on the additional capital issued as ordinary, 7 per cent.; and on the preference capital, 6 per cent. The borrowing powers are named at one-third of the issued capital. The Company desire power to purchase lands by agreement up to 3 acres. In regard to illuminating power, the proposal is 13 candles, with a maximum price of 5s. per 1000 cubic feet. The Metropolitan argand burner No. 2 is prescribed for the testing, with a 6-inch by $1\frac{5}{8}$-inch glass chimney, "and, if at any time the gas-flame tails over the top of the glass, a 6-inch by 2-inch chimney shall be used."

The Woking District Gas and Water Company, Limited, are likewise seeking additional capital powers. Their requirements are £30,000; and the amount named as the limitation of the whole capital is £66,000. The maximum dividend on the additional ordinary capital is proposed at 7 per cent., and 5 per cent. on preference capital. It is contemplated that the borrowing powers shall not exceed one-fourth of the amount of the capital; the interest being not higher than 4 per cent.

To the Secretary for Scotland, three Corporations are making application for Orders containing proposals regarding additional gas powers.

The gas clauses in the gas section of the Aberdeen Corporation Order are few but important. The first clause is intended to confer power on the Corporation to utilize in connection with manufacture a small piece of additional land. They ask for power to supply gas for all purposes upon such terms and conditions as may be agreed between the Corporation and the person to whom such supply shall be given. The Corporation also request power to supply 15-candle gas, tested by the Metropolitan argand burner No. 2, the bar photometer, and Harcourt's ten-candle pentane lamp. A proviso states "that while and so long as the gas supplied by the Corporation shall with respect to its illuminating power be more than 20 candles, the burner to be used shall be that known as the union jet." [*Parliamentary Agents: Messrs. Martin and Leslie.*]

Part 6 of the Dundee Corporation Order refers to both electric lighting and gas. In the first clause, it is proposed that, subject to the Dundee Electric Lighting Order, 1890, the area of supply as extended by the Dundee Corporation Act, 1897, within which the Dundee Gas Commissioners as the undertakers for the purposes of the 1890 Order, are authorized to supply electrical energy, shall be extended to embrace the district annexed, and so much of the district surrounding the burgh as lies within a radius of 700 yards—being the municipal and police boundaries as extended by this Order. A provision excludes any part of Broughty Ferry except by agreement. The next clause debars the Gas Commissioners from breaking up or interfering with any streets not repairable by the local authority or any railway or tramway within the extended area of supply without the consent of the authority, company, or person by whom such street, railway, or tramway is repairable, or of the Board of Trade. An electricity stand-by clause appears. It is further proposed that the Gas Commissioners may charge for gas supplied by them in the annexed district 1s. per 1000 cubic feet in addition to, or in excess of, the price for the time being charged by them for gas supplied for the same purposes within the existing burgh. The last clause in this part of the Order is to confer power upon the Commissioners to inspect gas-fittings in new buildings. [*Parliamentary Agents: Messrs. W. Robertson and Co.*]

The Glasgow Corporation also seek to have certain provisions of their Gas Acts repealed, and others substituted which will have the effect of prescribing 16-candle gas, tested by the Metropolitan argand burner No. 2, the bar photometer, and the Harcourt ten-candle pentane lamp. [*Parliamentary Agents: Messrs. Martin and Leslie.*]

WATER BILLS FOR 1907.

IN the two preceding issues of the "JOURNAL," we have noticed the principal features of the Gas Bills for the coming session. We now deal with those relating to the supply of water—taking first the measures promoted by Companies.

The Colne Valley Water Bill is to enable the Colne Valley Water Company to raise additional capital to an amount not exceeding £240,000 by shares or stock, the former to be of not less nominal value than £10, and the dividend to be limited to 7 per cent. if the capital is issued as ordinary, and to 4 per cent. if as preference. The new capital is to be offered by auction or tender; and it is to be one of the conditions that the full price, including premium, is to be paid within three months after the sale. Shares or stock not sold may be offered to the shareholders, employees, or consumers. The Company ask for power to borrow to the extent of one-fourth of the amount of additional capital authorized, and also to create and issue debenture stock, which is to rank *pari passu* with that now existing. Authority is sought to grant pensions and retiring or superannuation allowances to officers and servants, as well as to erect, fit up, and maintain cottages for them. [*Parliamentary Agents: Messrs. Dyson and Co.*]

The Great Yarmouth Water-Works and Lowestoft Water and Gas Bill is practically the measure which the promoters were unsuccessful in carrying through the two Houses last session. It is to authorize the construction of additional works, and the taking of water from the River Bure, for the purpose of affording increased supplies by the Great Yarmouth Water Company and the Lowestoft Water and Gas Company, and to confer further powers upon them. The new works are to consist of an intake on the above-named river in the parish of Horning, a line of pipes connecting it with a subsiding reservoir in the parish of Ormesby St. Michael, a pumping-station near the intake, and another pipeline from the reservoir to the pumping-station of the Great Yarmouth Company. The water is not to be drawn from any other part of the river than the point of intake; nor is it to be taken for the purpose of supply if it contains more than 20 grains of chlorine per gallon. Contravention of this provision will render the Great Yarmouth Company liable to a penalty of £10 a day. No water taken from the Bure is to be distributed unless it has been drawn from subsiding reservoirs having a total capacity equivalent to not less than five times the maximum quantity abstracted in any one day. A period of three years is asked for the purchase of lands, and seven years for the completion of the new works. The Bill includes a number of provisions for the protection of the Norfolk County Council, the Great Yarmouth Port and Haven Commissioners, the Ludham Drainage Commissioners, and the Bishop of Norwich. The promoting Companies ask for authority to supply each other with water, to sell water in bulk, and the Lowestoft Company to supply it by measure. The Company ask permission to raise £120,000, and the Great Yarmouth Company £80,000, of additional capital, to be limited to 7 per cent. if issued as ordinary, and to 6 per cent. if as preference. It is to be put up to auction or tender; and any stock or shares not sold are to be offered to the shareholders. Borrowing powers to the extent of one-third of the additional capital granted are applied for, as well as authority to create debenture stock. The Great

Yarmouth Company undertake to supply water for all Government purposes on conditions to be agreed upon or determined by an arbitrator; and they will not commence works below high-water mark without the consent of the Board of Trade. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

The Portishead District Water Bill is to empower the Portishead District Water Company to construct additional works, consisting of a pumping-station in the parish and urban district of Portishead, a covered service reservoir in the parish of North Weston, and a line of pipes connecting them, all of which are to be completed within seven years from the passing of the Act. The Bill contains provisions for the detection and prevention of waste and pollution, the sale of water by measure, and its supply to houses partly used for trade. The term "a supply of water for domestic purposes" is clearly defined in the Bill. Power is sought to raise additional capital to the amount of £24,000, carrying 7 or 5 per cent. dividend according as it is issued as ordinary or preference. It is to be put up to auction or tender, and any not sold is to be offered to the stockholders, employees, or consumers. Borrowing powers to the extent of one-third of the additional capital are required, as well as authority to create debenture stock. [*Parliamentary Agents: Messrs. Batten, Proffitt, and Scott.*]

The Selsey Water and Gas Bill, which is to incorporate the Selsey Water and Gas Company, and to enable them to supply gas and water in certain parishes in the county of Sussex, has already been noticed so far as the gas clauses are concerned. The capital proposed is £24,000, in £10 shares, with borrowing powers not exceeding £8000. The Company apply for authority to construct a well and pumping-station in the parish of North Mundham, and a conduit or line of pipes commencing there and terminating in the road leading from Fisher Common to the Chichester and Arundel Canal, to be completed in three years. The limits for the supply of water are the parishes of Selsey, Sidlesham, Pagham, North Mundham, and Hunston, all in the county of Sussex. Part of the Chichester Water Act, 1897, including the first two and the last of the above-named places within the Corporation limits, is to be repealed. The charges for water for domestic purposes are to be based on the rateable value of the premises; and where the supply is by meter, the maximum rate is to be 2s. per 1000 gallons. The usual provisions are made for sale of water in bulk, for making bye-laws for the prevention of waste, supplying materials, and removing meters, fittings, &c. [*Parliamentary Agents: Messrs. Baker and Co.*]

The South Lincolnshire Water Bill is to extend the limits of supply of the South Lincolnshire Water Company, as defined by the Act of last session, so as to include the portion of the parish of Deeping St. Nicholas not already comprised within them, as well as other parishes and places in the county of Lincoln. Should the Bill pass, all the powers of the Spalding Urban District Council in regard to the supply of water within the parishes of Bourne, Deeping St. Nicholas, and Pinchbeck will cease, and the portion of section 4 of the Spalding Water Act, 1900, relating to these parishes will be repealed. Confirmation is sought of an agreement for the purchase of the undertaking of the Fen Water Company. The capital specified in the 1906 Act (£30,000) is to be increased to £45,000, in £5 shares; and the borrowing powers, from £10,000 to £15,000. The additional capital may be raised by ordinary or preference shares or stock; but the holders are not to be entitled to a preferred interest of more than 6 per cent. per annum. The Bill contains some important provisions regulating the construction and use of boreholes and wells; and no one is to be allowed to sink them in positions calculated to prejudicially affect the water sources of the Company. Anyone offending against these provisions is to be liable to a penalty not exceeding £5; and, in the case of a continuing offence, to a further penalty not exceeding 40s. a day, after written notice of the offence has been received by the parties concerned. The Bill puts some important restrictions upon the removal of water from within the Company's limits of supply, except with the express authority of Parliament. [*Parliamentary Agents: Messrs. Baker and Co.*]

The Southend Water Bill is to confer further powers upon the Southend Water Company, extend their limits of supply, authorize the transfer to them of the water undertakings of the Leigh-on-Sea Urban District Council and the Billericay Rural District Council, and sanction the raising of additional capital. The extended limits will include the parish and urban district of Leigh-on-Sea, a number of parishes in the rural district of Billericay, and Langdon Hills and Fobbing in the rural district of Orsett, all in the county of Essex. The undertaking to be transferred consists of a well and pumping-station, machinery and fittings, and reservoirs, with the land and appurtenances belonging thereto or held therewith, and the mains, pipes, and other plant, stock, and effects of the District Council connected with the supply of water; and the price to be paid for it is £14,415 12s. 7d. Certain wells specified are to be retained by the Council. All mains laid or machinery fixed since Aug. 1, 1906, with the approval of the Company's Managing-Director are to be paid for in addition. The Company take over the loan indebtedness of the Council in respect of the water undertaking. The property of the Rural District Council consists of about an acre of land, with the boring and the buildings, machinery, and fittings upon it; and the Company will pay £2300 for the whole. The Council, however, are to have the option of retaining any rights now possessed by them, under agreements with the Company, for the supply of water in bulk to certain parishes named in the Bill. Provision is made for securing the water from the boring for use primarily within the Council's district; and the quantities to be guaranteed per day per head of the population are specified. The Council are to pay at the rate of 1s. 6d. per 1000 gallons for the water they require, and an annual rent of 30s. for each meter supplied by the Company. Authority is required for raising additional capital to the amount (including premium) of £250,000, in £10 shares, and carrying a maximum dividend of 5 per cent. per annum, whether issued as ordinary or as preference capital. It is, of course, to be put up to auction or tender, and any not sold is to be offered to the shareholders. Borrowing powers to the extent of one-third of the additional capital authorized are applied for, as well as permission to create debenture stock. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

The Wisbech Water Bill is to extend the limits of supply of the Wisbech Water Company, so as to include about twenty parishes in the county of Norfolk and half-a-dozen in the Isle of Ely, and to authorize the construction of an aqueduct, conduit, or pipe-line from one boundary of the Company's present area of supply to another. Permission is sought to raise additional capital to the amount, including premium, of £30,000, to be sold by auction or tender, and any not disposed of in this way may be offered to the holders of the ordinary shares or stock or to the employees of the Company. The additional capital is to carry 7 per cent. dividend if issued as ordinary, or 6 per cent. if as preference; and borrowing powers to the extent of one-third are sought in respect of it. [*Parliamentary Agents: Messrs. Dyson and Co.*]

OPEN VENTILATORS IN RETORT-HOUSE ROOFS.

In connection with a description published in the "Journal" on Jan. 1, of the large retort-house at the works of the South Suburban Gas Company, a question has been raised as to what was meant by the sentence: "It will be remarked that it [the roof] is quite a simple structure, with an open ventilator along the top, after the manner of the first retort-house put up by Mr. Edward Drory at the Mariendorf (Berlin) works." What was intended by the use of the words "open ventilator" here is an open space—4 feet wide—running the full length of the house, at the ridge of the roof, without covering of any kind, but free to the heavens; and in referring to this clear space being a form of construction "after the manner of the first retort-house" put up at Mariendorf, it was not by any means a suggestion that this was the *first* retort-house that had had free space in the roof provided for ventilation. As a matter of fact, this first retort-house at Mariendorf was only built in 1900-1; and seven years before that Mr. Drory had shown the same form of construction in his design for a retort-house at Vienna. Of course, Mr. Drory did more than provide open ventilators in these houses. The one at Mariendorf contains double benches, in parallel; and there is between them a clear space from the ground level up to the open ventilator. Before Vienna, too, there had been open ventilators in England for many years; but their original introduction was no doubt more by accidental circumstance than design. But thirty or forty years ago, there was not such a careful published record of engineering work and details in the gas industry, as at the present time. Work was dealt with generally and not individually or particularly; and so for much that is of historical interest, we have to depend upon men's recollections.

However, it has been said above that possibly the open ventilator came about more by accident than design. If this is not right, then perhaps those who have any evidence to the contrary will advance it for the sake of interest. Retort-house roofs were at one time made with lantern tops, with louvres at the sides of the lanterns. The slates were fastened to the iron battens, with copper or lead pins or wires. The former corroded; and the latter would not hold firmly. [Afterwards wood was fixed to the iron, and the slates nailed to it.] The result was that periodically storms would blow off a large proportion of the slates, especially from the lanterns, and at length, instead of replacing the slates after a storm, the remainder were, in some cases, taken off, as the shortest cut out of the difficulty. This was found so satisfactory that, in instances within knowledge, the entire lantern was removed, and a corrugated iron open ventilator substituted. Since then retort-houses have frequently been built with open ventilators—in fact, we believe there are two houses in London, erected in the sixties, still standing, with open ventilators. This, anyway, is the story of how the open ventilator came to be adopted as a feature of retort-house construction in the case of one London Company. Mariendorf, Plymouth, Lower Sydenham, and certain other places show that the principle of the open ventilator is being continued in modern retort-house construction, though far from universally—notwithstanding economy and satisfactory experience. Of course, in modern retort-houses there is greater need for adequate ventilation—with the higher heats now worked, the greater amount of coal dealt with on a given area, the heavier charges carbonized, and the greater masses of incandescent spent material expelled from the retorts—than under the less stringent conditions of other days; but the interpretation of the term "adequate" must not be too liberal, so as to lead to excess. For excessive ventilation in a retort-house is, just as is insufficient ventilation, a mistake.

THE FUTURE OF VERTICAL RETORTS.

A paper was read last September by Herr Eisele, of Cassel, before the meeting of the Mid-Rhenish Association of Gas and Water Engineers, which was held at Bruchsal, on the "Vertical Retort in Relation to the Future of Gas Manufacture." The paper was only published in the "Journal für Gasbeleuchtung" of the 5th inst.; and from this source the following abstract of its contents has been translated.

In 1903, the late Herr Merz, of Cassel, delivered the Presidential Address to the Mid-Rhenish Association; but its publication was deferred until after his death in February, 1904. In due course, a summary of the address—in which he discussed the trend of invention in retorts and settings, was given in the "JOURNAL" (see Vol. LXXXV., p. 770). Herr Eisele referred appreciatively to the foresight which his late colleague displayed in that address; and, in regard to the comments on carbonization in large chamber ovens and vertical retorts, he mentioned that Herr Merz had himself tried a setting at Cassel which was intermediate between a chamber oven and a retort. With this setting (which was still at work), the yield of gas per ton of coal and per square foot of ground-space was smaller than with ordinary retorts; but the coke obtained was better, harder, and denser. In the discussion on Herr Merz's paper, most speakers considered that economy of space was the chief purpose and utility of the vertical retort; but Herr Eisele had then expressed the view that the main advantages and object of the vertical retort would rather be that the setting would be simpler and more rational in construction, and that the material would be naturally or automatically passed through the carbonizing chamber. The inclined retort represented a transition stage. This view was, he thought, endorsed by what had already taken place in the development of the vertical retort, to three existing systems of which—the Dessau, the Settle-Padfield, and the Woodall-Duckham—he proceeded to refer. The vertical retort, in addition to the advantage of more natural construction and operation, promised, he said, to afford, as compared with horizontal and inclined retorts, a larger yield of gas and ammonia, better coke and tar, and gas poorer in naphthalene. There was a reduction in the labour required, and eventually perhaps they might hope for continuous carbonization with addition of water gas, and withdrawal of the coke ready quenched and cold. These advantages, however, had so far been only partially secured; but they were so worthy of pursuit that the further development of the vertical retort should be pushed on with the greatest energy. The inventors of existing types were apt to overrate their advantages and underrate their faults and the advantages of others. An impartial review of what had been done so far should, therefore, be profitable, especially if stress were laid upon the more significant features and achievements of each type.

Herr Eisele then described the following types of vertical retorts, which are familiar to most English gas men from the descriptions which have appeared in the "JOURNAL," which Herr Eisele names as the source of his information in many cases.

He dealt first with the Dessau vertical retort, of which he spoke favourably, though he considered that the method of closing the bottom of the retort was unsatisfactory. Though the Dessau retort constituted a marked advance, it could not be supposed that finality in development had been reached with it; for it embodied periodic charging and discharging, with their disagreeable consequences, such as the evolution of smoke and vapour, incommoding the workmen by heat and bad air, and endangering them by the rush of coke. A continuous carbonizing process should ultimately be found which would get rid of these evils. Herr Eisele next referred to the Settle-Padfield vertical retort, which had, he said, the advantage of continuous charging; but the discharging was effected periodically in a manner that suggested a combination of a vertical with an inclined retort. The charging apparatus, moreover, did not appear happily chosen for dealing with a material like coal. Another setting was the Woodall-Duckham, in which continuous carbonization was aimed at. How far these two English settings achieved their aims it was impossible to say from the few results which, to Herr Eisele's knowledge, had been published; but the charging and discharging arrangements seemed to him not well conceived. The English people seemed enthusiastic over the settings of their countrymen, and much opposed to the Dessau setting. It was, however, unsatisfactory to pronounce judgment until further working results had been published.

Vertical retorts had also been constructed by Rummens and by Lachomette in France; but they resembled the Dessau type, and had no characteristic novelties. Verdier and Teulon, of Marseilles, had designed one for continuous carbonization; but the hollow rotatory valves by which the coal was inserted and the coke removed seemed highly unsuitable for the purpose. The setting of Bäker, of Budweis, had the retorts disposed in a circle; but otherwise they resembled the Dessau retort. Kämpfe Bros., of Eisenberg, had devised a vertical retort like the Settle-Padfield, but without continuous charging. This setting seemed promising, pending the design of one for continuous carbonizing. Another vertical retort-setting had been designed by Martin and Pagenstecher, of Mülheim-on-Rhine. With reference to all the settings named in this paragraph, Herr Eisele had been unable to obtain working results or full information—perhaps because even trial settings have not in many cases been put into operation.

Herr Eisele next remarked on the special attention and zeal which were being devoted in England to the vertical retort question, as instanced by the series of articles in the "JOURNAL," by Mr. William Young, Mr. W. R. Herring, and Mr. Thomas Glover. These articles he said, pointed to vertical retorts having been applied in England for forty years, but for the carbonization of Scottish oil-shale, with which the production of paraffin oil and ammonia rather than of gas was the object. Nevertheless, the vertical retorts in question might serve as valuable prototypes for vertical gas-retorts, and should be studied in this light.

Herr Eisele then proceeded to recapitulate briefly what Mr. Young had done towards developing the oil-shale retorts, and referred to the retorts which he had erected in 1872 for coal-gas manufacture for the Musselburgh Gas Company, and to the Young and Beilby "Pentland" setting of 1882. Reference was also made to Bryson's and Carpenter's improvements for removing the coke from the shale retorts, and to the retorts used in the oil-works of Saxony and Thuringia. Herr Eisele then passed on to the Herring and the Young and Glover vertical-retort designs—both of which, he remarked, were externally very similar, were simple and natural, and suggestive of the solid construction of a blast-furnace. Both aimed at continuous carbonization. Both embodied continuous charging, and approximately continuous withdrawal of the coke in a cold quenched state. The water vapour resulting from the quenching rose through the layers of incandescent coke and formed water gas therewith. The settings differed in the details of construction of the charging and discharging apparatus.

Having called attention to the features of the various existing types of vertical retorts, Herr Eisele went on to discuss which construction seemed to be the most correct and afforded the most promising results. The question was, however, he said, not yet susceptible of a direct and simple answer. But reviewing what had been done, he considered that the Settle-Padfield retort had charging apparatus of imperfect construction; while the continuous charging and intermittent discharging caused the level of the charge to vary, so that carbonization occurred under changing conditions, from which a uniform gas could not be expected. The same comment of imperfect construction applied to the charging device of the Woodall-Duckham retort, and he was not yet aware whether their latest type of coke-withdrawing apparatus answered well. The carbonizing conditions, however, compared favourably with those of the Dessau retort, as they remained constant, instead of changing periodically as with the latter. The quenching of the coke within the setting, and the addition of the steam thereby evolved, were favourable to higher yields of gas and ammonia with the Woodall-Duckham retort. The Dessau retort, however, had so far been more fully tested than others, and was being extensively adopted. It had the advantage that the retorts were readily accessible both at the top and at the bottom, and were easily controlled. The retorts of Herring and of Young and Glover were very interesting; but practical trials were wanted. They embodied many of the points which he (Herr Eisele) regarded as essential in an ideal vertical retort. It had been contended that the production of water gas concurrently in the vertical retort would render the residual coke less valuable, because a part of the carbon would have been abstracted in the form of carbonic oxide, while the whole of the ash remained—thus increasing the proportion of ash in the residual coke. This contention, however, was not well founded, as only about 2 lbs. of water vapour resulted from the quenching of 100 lbs. of coke; and this would oxidize less than 1 lb. of carbon. Probably at least as much carbon was oxidized when ordinary gas-retorts were drawn. Opponents of the vertical retort had further argued that the retorts would soften under the heat to which they were exposed, and would be distorted by the internal pressure of the coal. Nevertheless, in fact, they appeared to last better than horizontal or inclined retorts. It was, however, remarkable that the gases in passing through the layers of coal in the vertical retort were less readily decomposed than in the coke-oven, which worked under similar conditions and only yielded a poorer gas. The usual explanation was that the gas in the vertical retort rose upwards through the interior of the coke and coal, and did not come in contact with the hot walls. This explanation, however, did not appear wholly satisfactory.

Reviewing what had been done so far, the following facts appeared to have been established:—

1.—Gasification in vertical retorts was possible, and would be more advantageous than in horizontal and inclined retorts.
2.—The durability of the retorts, their reliability in operation, and lightening of work, and better carbonizing results had been established beyond contradiction, more especially in the case of the Dessau retort.
3.—In order to convert the nitrogen of the coal into the more valuable form of ammonia, steam must be introduced into the gas-making retorts, and the maximum yield of ammonia would be attained by increasing the quantity of steam as the temperature of carbonization rose.
4.—A larger addition of steam increased the yield of gas, but diminished the calorific power of the gas, which should not be allowed to fall below 5000 calories per cubic metre (562 B.Th.U. per cubic foot), and to a certain extent the quality of the coke.
5.—If only the steam resulting from the quenching of the coke were introduced into the retorts, the quality of the coke was scarcely affected.

These facts opened before gas men a vista of a better, more economical, simpler, and less exacting style of gas manufacture in the future. The Dessau retort had achieved much; but later greater perfection was to be expected in the attainment of continuous carbonization, a more permanent construction, an increased yield of gas, and less exacting working conditions, due to the suppression of smoke, vapour, and oppressive heat. The future of gas manufacture was assigned neither to the horizontal nor the inclined retort, nor to the coke-oven, but to the vertical retort, with the ideal continuous carbonization.

ANOTHER USEFUL COAL-TAR PRODUCT.

Tracing Water by Fluorescein.

Among the papers on the subject of "Underground Water" published by the United States Geological Survey in the past year was one by Mr. R. B. Dole, in the course of which a material called "Fluoresceïn" was stated to have proved superior to everything else tried for tracing the flow of large or small underground streams through well-defined channels in rocks, especially in calcareous formations. From an abstract of the paper given in "Engineering Record," it appears that fluoresceïn is a coal-tar product, and occurs as a crystalline powder or in amorphous masses, varying in colour from reddish yellow to dark brown. In the presence of alkalies, its solution is red by transmitted light and bright green by reflected light—a phenomenon known as green fluorescence. For a flow indicator it is important to use fluoresceïn of good quality, as otherwise the coloration will not be visible in a solution sufficiently dilute. The most practical test of the applicability of a sample of fluoresceïn seems to be that it should be apparent with the fluoroscope in a dilution of 1 part in 10,000 million parts of water. If any weaker material is used, a larger quantity is, of course, necessary. In its perfected form, the fluoroscope consists of twelve tubes of pure white glass of even bore, each 950 mm. long and about 15 mm. in diameter. Each tube is closed at its lower end by a rubber stopper blackened with powdered plumbago. A rack is provided in which the tubes are held side by side in a vertical position. When they are filled with samples, the presence of fluoresceïn is recognized by the appearance, projected on the black cork, of a greenish reflection which is entirely different from the natural tint of the water. It is often convenient to use for comparison standard tubes containing dilutions varying from 0 to 0·002 part per million. The limit of visibility depends greatly on the nature of the fluoresceïn used. It has been placed at 1 part in 10,000 million parts of clear water; but for practical demonstration 5 parts in that quantity is better. The limit of visibility with the naked eye seems to be 250 parts per 10,000 millions. By comparison with tubes of known content, the amount of fluoresceïn in the samples may be estimated; and with this and other data the seepage from one water-bearing stratum to another may be determined.

Fluoresceïn can be poured down where there is expected to be a connection with the underground flow—in general at any point of higher elevation than the water level in the bed under study. Sink holes, cesspools, temporary borings, or the beds of degravelling streams are all desirable places to introduce the dye. If it is poured down where there is no considerable flow of water towards the lower strata—such as in a dry boring or vault—enough water should be thrown upon it to wash it down. The quantity of fluoresceïn to be used varies with the distance travelled, the time of the journey, the size of the sheet of water, and the nature of the material traversed. The amount generally employed is between ½ lb. and 2 lbs., though experiments have been made with much greater weights. In general, the quantity is 2 lbs. of fluoresceïn per hour for a flow of about 31,700 gallons per minute from the bed. It is, of course, necessary to add enough to produce a detectable coloration in the water of the well or spring under examination. Having determined the flow of the latter, an approximation may be made of the amount of fluoresceïn necessary to ensure the presence of a visible quantity in the effluent. Since, however, all the water of the underground bed will probably not be delivered at the points of examination, the amount of fluoresceïn should be increased with the distance travelled.

Fluoresceïn has been extensively used by the authorities of Paris in the study of springs from which the greater part of the drinking water is taken. An especially noteworthy experiment was conducted at Auxerre to demonstrate the passage of polluted water from a ditch, through alluvial deposits of sand and gravel, into a collecting gallery from which the city supply was taken. An account of this experiment, prepared from a paper by M. le Couppey de la Forest, illustrates the method of drawing certain conclusions from the test results. A collecting gallery, about 300 feet long, in the alluvium of the Yonne is situated from 130 to 230 feet from the river. Its top is 2 ft. 9 in., and its water plane 4 ft. 4 in., below the surface. A polluted brook ran directly towards the collecting gallery till within 28 feet of it, then turned nearly at a right angle, and paralleled it at about the same distance. Its water surface was from 1 ft. 2 in. to 3 ft. 6 in. above that of the gallery, from which 1,130,000 gallons of water were pumped daily. One kilogramme (2·2 lbs.) of fluoresceïn was put into the brook 254 feet in a straight line from the collecting galleries, and samples were then taken of the water pumped from the galleries. Fluoresceïn was shown 2¼ hours after the dye was put into the brook; and an intense coloration was clearly visible to the naked eye in about 10 hours, lasting for 13 hours. By examining samples from many sources throughout the city, and estimating the amount of fluoresceïn present, it was found that the city water was coloured for 13 hours at an average of 1 part of fluoresceïn in 30 million parts. During this period about 600,000 gallons were pumped from the galleries, containing, therefore, 0·17 lb. of fluoresceïn. Since 2·2 lbs. were put into the brook and 0·17 lb. reached the city water, it may be estimated that the ditch water reached the galleries in the proportion of 2·2 : 0·17; or, to allow for some small error, about 1-15th of the brook water infiltrated to the city supply. As previously stated, it took 2¼ hours for the fluoresceïn to reach the filter galleries. Assuming that the infiltration extended from the point at which the material was put down, the colouring matter would have progressed at the rate of 113 feet an hour through the alluvial deposits. If, on the other hand, the infiltration took place between the ditch and the gallery at the nearest point, it occurred at the rate of 12·4 feet per hour. But, assuming a maximum filtration rate of 3 million gallons per acre per day for an efficient sand filter, it may be inferred that this brook water reached the collecting galleries with practically no purification.

In the course of his paper, Mr. Dole called attention to the following points: (1) In determining the sanitary value of a well or spring, it is more important to study the underground flow than to analyze the water itself. (2) Foreign substances put into the aquifer and traced from point to point are of great use in this study. (3) With the fluoroscope, 1 part of fluoresceïn can be detected in 10,000 million parts of water; and fluoresceïn is a particularly valuable flow indicator for fissured or cavernized rocks. (5) It is also available in gravels, where it has been used with success. (6) It progresses at a slightly slower rate than the water in which it is suspended. (7) It is not decolorized by passage through sand, gravel, or manure; it is slightly decomposed by calcareous soils. (8) It is entirely decolorized by peaty formations and by free acids, except carbonic acid.

The Identity of the "Graetzin" Lamp.

In the references that have been made in our columns to the "Graetzin" inverted gas-lamp, and the results of tests with it in Vienna in comparison with other lights, it has been suggested that the lamp was unknown in this country. As a matter of fact, it is a lamp that has been sold, by certain of the wholesale houses, under other names. One correspondent informs us that he has purchased "Graetzin" lamps, under that name, from Messrs. J. & W. B. Smith, and that firm have informed us that the lamp is the one they are selling as the "Nero." Messrs. Falk, Stadelmann, and Co., Limited, have communicated the intelligence that they have for some time been dealing with the lamp as the "Vesta." Messrs. James Milne and Son have also been selling it under the title of the "Viaduct." And doubtless, if inquiries were made, it would be found that other wholesale houses were also prepared to supply the lamp under some other designation. However, with such nominal distinctions, it would not, of course, suggest itself to anyone outside those commercially handling the lamp that the "Graetzin" the "Nero," the "Vesta," and the "Viaduct" were all one and the same. Mr. Hubert Pooley, the Engineer and Manager of the Stafford Gas and Electricity Department, writing on this subject, says: "I notice in one of your valuable leaders this week mention is made of the 'Graetzin' light, and that it is unknown in this country. Might I correct you, so far, in saying that we have had 'Graetzin' lamps in use in Stafford for some weeks now. I think it would be a good suggestion if the makers or agents of new lamps could be persuaded to send advance examples to the Editors of our Technical Press; and I believe, if such a step were taken, we should find that it would promote the interests of our industry, and at the same time be of great advantage to the agent or agents of valuable lights, which might be introduced in this way." Mr. Pooley also bears testimony to the high efficiency of the lamp.

The London and Southern District Junior Gas Association are holding a meeting to-morrow, at the Cripplegate Institute, to hear a lecture by Mr. W. H. Y. Webber on "Flame Temperature in Its Practical Aspects."

The Gas Supply of Paris.—We learn from the "Journal de l'Eclairage au Gaz" that the Committee appointed to consider the tenders submitted for the future control of the gas supply of Paris have selected five as being calculated to be suitable; and they are now under examination. Pending a decision as to the one to be recommended for acceptance, the Municipal Council, notwithstanding their vote that the provisional management of the supply by the Liquidators of the Gas Company should cease at the close of the past year, have sanctioned arrangements with them for its continuance for a period "terminable in the month following the day on which the Council shall decide that it shall come to an end." A month's notice is to be given to the Liquidators of the entrance into possession by the new concessionary. It is thought at the Hôtel de Ville that the delay which will now take place in the settlement of this troublesome question will afford an opportunity for the Labour representatives on the Council to urge certain demands of the gas workers which have not hitherto been considered admissible.

VICTORIAN GAS MANAGERS' ASSOCIATION.

First Annual Meeting.

The First Annual Meeting of the Association, which was formed about a twelvemonth ago, took place in the Rooms of the Victorian Institute of Engineers, Melbourne, on November the 7th. The chair was taken by the PRESIDENT, Mr. R. O. Thompson, of Melbourne. There were 34 members in attendance.

The HON. SECRETARY (Mr. P. C. Holmes Hunt, of Melbourne) read the minutes of the formation meeting, on Nov. 8, 1905;* and Messrs. J. Bowman (Sale) and B. Lord (Maryborough) were elected Auditors.

The report of the Council having been received and adopted, the members proceeded to discuss the draft proposal of rules submitted by the Council for approval. After discussion, these were approved with one or two minor alterations.

PRESIDENT'S ADDRESS.

The PRESIDENT then delivered his Inaugural Address, in the course of which he said:

On taking the chair as President of the Association at this the first annual meeting, it is hardly necessary to say how highly I appreciate the honour you have done me in placing me in the position. The members may be congratulated on the success which attended the Inaugural Meeting in November of last year, when so many representatives from the various Gas Companies in Victoria accepted the hospitable welcome extended by the Metropolitan Gas Company.

Two visits of an interesting character were made during your stay in Melbourne. The first of these was to the Metropolitan Gas Company's South Melbourne works, where we were received by the Resident Manager (Mr. Charles Howlett), one of our members, who conducted us over this extensive establishment. The gas made at these works is stored in three holders, one of 1 million cubic feet and two of upwards of 3 million feet capacity. These holders are on the non-trussed principle, with strong steel crown curbs; and they are guided when in action by lattice standards, connected by Warren girders and diagonal tie-rod bracing. Features of the works are the large and commodious meter and stove workshops, dealing with some 10,000 meters and 5000 stoves in the course of the year. The second visit was made to the Spotswood sewerage pumping-station of the Metropolitan Board of Works, where we were taken by steam launch, at the kind invitation of the Board's Superintending Engineer (Mr. Calder Oliver), who, with Mr. Smith, the Officer in Charge, explained the method of pumping the sewerage. On each of these visits we enjoyed the hospitality of our kind friends, who received us most heartily.

It is of primary importance that the Association should be strengthened by obtaining new members, and its interests advanced by the reading of papers. To prepare papers is, perhaps, not an easy matter; yet they are the mainstay of Associations such as ours. I hope the members will give their earnest attention to this subject, and also endeavour to be present at the annual meetings; thereby adding to their store of information as well by the interchange of ideas and experiences, as by the facilities for becoming known to each other and forming friendships of mutual esteem and respect. They will also be enabled, by participating in visits of inspection to large and progressive works, to increase their useful and practical knowledge.

The depression which existed in Victoria for some years after the collapse of the "boom" which had such a retarding influence on business generally, was severely felt by the Gas Companies, who were still further adversely affected by the Government adopting a change in the method of keeping meridian time, causing a loss of twenty minutes' lighting each night. The depression is now passing away; and renewed prosperity is anticipated with the opportune rains and abundant harvests.

The stores of gas coal at command—with some limit as to cost—is a question of vital importance to members of the gas profession, who have to distribute the light and heat obtained from every ton of coal distilled in the retorts. The coal area worked in Victoria does not yield a gas-making coal; and our supplies are obtained from the upper coal measures in the Newcastle district of the adjoining State of New South Wales, where fields of magnificent coal exist, divided into an upper, middle, and lower series. Some of the recognized seams in the upper measures are ideal gas coals, with less than ½ per cent. of sulphur, and rich in gas-producing qualities, with a resultant coke of the highest class. These seams are gradually becoming exhausted—one mine has already closed down—and it is satisfactory to know that several seams of valuable gas coals are being developed in the Maitland district, a little to the west of Newcastle.

The coal used in Victoria is necessarily sea-borne; and we are more or less in the hands of the shipowners with whom contracts have to be entered into. The colliery proprietors and the shipowners have recently entered into a strong combination, and announce an increase in price for all coal contracts for next year. Happily, the threatened strike of the coal miners has now been averted; and satisfaction must be expressed at the result of the conference between the colliery proprietors and the miners' delegates. Each side has gained something contended for; and we, as customers, are called upon to pay an enhanced price for our contracts. Yet we are immensely relieved at the settlement arrived at on the points in dispute, which seemed at one time likely to end in a disastrous calamity. On the last occasion of a strike—the maritime strike—gas coal had to be obtained from Queensland, Japan, and even England.

The cost, inconvenience, and alarm occasioned by the gas stokers' strikes in 1889 gave an impetus to the use of machinery for the handling of coal and coke in retort-houses; and now carbonizing in the larger works is less dependent on the workman. The West and Arrol-Foulis machines, as evidence of mechanical skill applied to the charging and drawing of retorts, have more than justified the claims advanced by their inventors, "that the distillation of coal would be performed with greater economy and with more efficiency." This supremacy is, however, now challenged by the more recent types of rotary machines designed for throwing the coal, in even layers, uniformly throughout the length of the retort. The West and Arrol-Foulis machines have been at work in Melbourne for some years; but in the small works of Victoria, where the method of charging is by the shovel, the question of machinery is of minor importance. In a few of the works a simple and expeditious method of charging with the scoop is in use, as first introduced at the South Melbourne works, where more recently an overhead traveller has been adopted for working a small number of retorts.

An installation of inclined retorts, now in process of renewal, will be inspected on your visit to the West Melbourne Gas-Works. The vertical retort has not yet arrived; but it is thought by the more optimistic of gas engineers that this will be the retort of the future. I had the privilege of seeing both the Settle-Padfield and the Woodall-Duckham systems when in England, and formed the opinion that, however suited for small installations, there was yet much to be done before venturing the system of vertical retorts on a large scale. The question of the best number of retorts to be set in a bed is one of convenience, and personal predilection, and may be left to individual judgment and experience. There can, however, be no two opinions as to the advantages to be derived from the regenerative system of heating retorts, where it can be applied, whatever the number in a bed; and neither stoking machines nor inclined retorts would be so successful were it not for the uniform heats rendered possible by regenerative furnaces.

In purification, after the condensable vapours have been parted with in the condensers and washers, and the scrubbers have efficiently done their work in eliminating ammonia, as well as in partially removing carbonic acid and sulphur, the cycle of operations is completed in the purifiers, which, in order to reduce the speed and pressure of the gas, should be ample in superficial area. The cost of purifying material need not be a large item, with a minimum of sulphuretted hydrogen contained in the gas, and abundant deposits of iron oxide at disposal.

We are not yet in a position to commercially recover the products from the spent oxide, or those to be obtained by the redistillation, or fractional distillation, of the tar. The cost of labour, fuel, &c., and a limited demand, determines the chemical manufacturer to import, rather than locally recover, the constituents to be obtained by the manipulation of the spent oxide, or those of greater value derivable from the more complex mixtures of tar. An outlet for the residual tar has existed for years in the making and maintenance of roads; and the sulphate of ammonia manufactured is exported at remunerative rates, notwithstanding that the cost of production is high from causes already mentioned.

The State legislation during the past year touching the gas industry was in the first instance the clauses in the Electric Tramway Bill safeguarding the pipes from the danger of electrolysis, and "that the electric light should not be supplied beyond a certain distance from the tram-rails." The second instance was the Boiler Inspection Bill—a measure to be welcomed in the interests of safety to human life and property. Boiler attendants must be provided with certificates of competency, and boilers must be kept in the best possible order, ready for a visit from the Government Inspector at any time.

The distribution of gas requires increased intelligence and attention on the part of those responsible for the full and sufficient supply, necessary to meet the ever-increasing demands of gas-stoves, prepayment grillers, and the heating and power business, which involve the pressures being kept up in the day time. It has now become a distinct necessity that incandescent burners, mantles, pendants, and all other accessories for the development of gas should be kept in stock, and the commercial side of gas-fitting cultivated by gas companies on lines similar to our pushing competitors, the electric light and oil. The fragile nature of the Welsbach mantle is such that it should be in the hands of an expert, for cleaning and renewal purposes; and a system of maintenance is advisable to give satisfaction, and keep in close touch with the consumers, who are generally pleased when a little attention is paid to them. The advantage of the incandescent gas-light is becoming more and more recognized; and it has now

* See "JOURNAL," Vol. XCIII., p. 163.

obtained a permanent position in the lighting of streets and open places. This is acknowledged by the electricians—especially with high-pressure lamps.

In reference to the educational outlook in this State of the future gas engineer or manager, who should have a sound practical education and a good mechanical knowledge to enable him to deal with a varied body of workmen, the University requires that the intending student must have matriculated; and its more elaborate education may not be within the reach of everyone. But an equally good, though not so extensive, education is provided at the Working Men's College and at the various Schools of Mines, where there are appliances and laboratories properly equipped for the teaching of practical science. There is no reason, therefore, why we should not soon have our gas engineers, managers, chemists, and officers trained in our midst, so long as we get the right kind of students.

Mr. G. SWINBURNE (the Minister for Agriculture and the Managing-Director of the Colonial Gas Association) said he had much pleasure in proposing a vote of thanks to the President for the address he had given to the Association. They all knew that Mr. Thompson was one of the veterans of the gas industry of Victoria—or, indeed, Australia; and they were very glad indeed to have him as first President of the Association. He had spoken on many important matters in connection with their business, and one in particular which would affect most of the gas managers—that was the increase in the price of coal. He was sure they would all begin to feel this, not only as Managers, but as Directors. He only hoped the consumer would feel it also; for very often a rise in prices had ultimately to be paid by him. It was a difficult matter, when a few shillings per ton were added to the price of coal, to supply gas at the same rate, pay the same dividends, and make everybody satisfied. If the colliery people stood to make a loss, they saw that someone had to pay for it; but with the increased facilities they had, and better ideas to bring to bear upon their work, they hoped to be able to make up the difference without touching the consumer. Increased consumption would help them. The President had also touched upon another very important matter, and that was education. He sometimes thought that the Association might be used educationally for the benefit of the members and of those who might be their gas managers in the future. It was very hard for members, spread about as they were in isolated towns throughout the State, having very little communication with each other, and depending for information altogether on the gas papers that they had from England, to keep up to date. They had a great deal of responsibility; and the more the Association could help in educating them, the more it would fulfil its functions. There were no other means that he knew of for training gas managers than gas-works. Most of their works were small, and the managers of small works had to be all-round men—business men, plumbers, stokers, &c. There were very few businesses where a man had to do so much as the manager of a small gas-works. He must know everything connected with his business, or he was not of much account.

Mr. FIGGIS (Ballarat) seconded the motion. As Mr. Swinburne had mentioned, Mr. Thompson had touched on a great many points of interest. Their first consideration was, of course, the rise that was coming in the price of coal. But there were other points in the address which they might think over. He quite agreed with what Mr. Swinburne had said regarding the need of facilities for the education of gas managers.

Mr. FULTON (a Director of the Colac Gas Company) supported the motion. The reason he was present to give countenance to the conference by his Board was because of the strong desire they had that something should be done by country gas managers to educate themselves, and keep in advance of current thought in regard to the production and distribution of gas. It was absolutely necessary, in this progressive age, to keep gas companies up to what they ought to be; and he looked forward with considerable hope to the future, in view of the benefits that were likely to result from the formation of the Association.

The motion having been carried with applause,

The PRESIDENT thanked the members for their hearty vote. He said his year of office had been a very easy one, as he had been effectively assisted by the Secretary (Mr. Hunt). So far as his address was concerned, he did not intend to give them more than a short account of what was going on.

The reading and discussion of papers was then proceeded with. The first was by Mr. R. BEARUP (Hamilton), in whose absence it was read by the Hon. Secretary. Its subject was

WHAT SMALL GAS COMPANIES HAVE TO MEET.

The thought that some of my fellow managers are watching what will be the result of electric opposition on a gas-works in a place like Hamilton, has led me to give a record of my own experience in the last year or so. Hamilton is a comparatively small town; the population at the last census being only 4170. Perhaps to-day it is 5000; and it is increasing. Yet I know of no other place so small where both Gas and Electric Companies are running. A gas-works was built here by Mr. Thos. Bowman, sen., and opened in May, 1878; the Company having in those 28½ years passed successfully along, and having during the last 20 years that I have been there never paid the shareholders less than 8 per cent. per annum—sometimes more. To-day we are opposed by a local Electric Company; and a record of how these companies are being started in small towns may help some of my comrades in the gas industry to decide how best they might meet the difficulty, or whether they should embrace the opportunity, when it arrives, and run the gas and electric business under one management.

There are several gentlemen in Victoria, some of whom have been employees in electric companies, who are now doing the country towns which at present have no electric companies—trying to get municipal councils or local companies to go in for electric lighting, and offering to supply and erect plant to do the work, and run it for a few weeks, for a given sum. The average councillor looks upon gas as old-fashioned and electricity as up-to-date, as our local Council not long ago advertised in the Sydney and Melbourne papers: "Tenders for Lighting Streets of Hamilton, Gas Excepted." In some half-a-dozen small towns in Victoria endeavours are being made to float electric companies. I believe these travelling electricians are agents for some particular firms who supply engines, dynamos, cables, lamps, &c. Before an electric company can start, there must be a poll of the ratepayers; and a majority vote will give them permission to commence operations. What body of ratepayers would go against the spending of money and the erection of plant? So they vote for it, as our people did—254 for, 22 against.

In Hamilton, a local Electric Company was formed by these gentlemen two years ago; and a start to light up was made in November, 1905. A 26-H.P. oil-engine was used for driving the dynamo. Every now and again something went wrong, and the lights would go out; these failures being incidental, so the newspapers would say, to all new things. Then another oil-engine was added, so that No. 2 could be started while No. 1 was being repaired. Before No. 2 oil-engine arrived, I tried to recommend a Crossley gas-engine for reliability; but it was no use, as the Electric Company wanted me to quote gas at Melbourne price. Up to the present our opposition runs from dark to midnight; but at their last meeting, the Company decided to instal a storage battery, so that customers can have a continuous supply.

As to prices for current, which is almost all contract, the first customers obtained 16-candle lamps, from dark to midnight, at £1 per lamp per annum. I should say this is not a paying rate, if the lamps are used much. Some of the recently added places have to pay a much higher rate, and are finding out they are paying more than they formerly did for gas. The Borough Council have accepted a contract for three years for five 1000-candle power arc lamps, at the five principal corners, at £10 per annum per light and £1 per year hire for each lamp.

What took on with the electric customers we first lost was a fixed amount each month for their accounts—summer and winter—irrespective of how much current was used between dark and midnight. To try and meet this, I made contracts with twelve places where a fair amount of gas was used (five being hotels) for one year, at a fixed monthly sum; but I found that in several cases an extravagant consumption immediately took place, so that an open contract in their cases cannot be renewed at the same rate again. In some other instances a year's contract has been arranged—so much gas for so much money (which is fair), taking a year's consumption and dividing by twelve and giving a discount, making the monthly payments equal. Should they increase their consumption, we allow it at the lowest, or gas-engine, rate; and this is the only sort of contract we are likely to adopt in future, though if our opponents charged by meter we should be on a more equal footing. The advantage the Electric Company have had so far in regard to contracts has been that they cease to run their machinery after 12 p.m.; so that they know the hours the light is used.

The Gas Company, so far, have lost 28 places—some wholly, some partly. This is just 10 per cent. of our number of meters out; and as some half-dozen or more of the electric shareholders are still using gas, they may leave in time. To a small Company like ours, when several leading hotels and business places which used gas every night, cease to do so, it is noticed and felt. However, I have, by offering free services and shilling slot-meters, and fitting up places just so as to clear expenses, added more services than I have lost, though the added ones are not so important as the customers who have gone over to electricity. But they have taken shares, many of them, and so feel compelled to support their own Company.

Our gas consumption has been on the increase all this year, though a great deal of the increase is on the open-contract customers. With an opposition Company to work against you, grumblers are not slow to exact all sorts of attentions. In towns such as Hamilton, with firewood retailed at 5s. per ton in the summer, and 6s. in winter, there is not much gas used for cooking—mainly a few boiling-rings.

It may be asked: How does the Electric Company pay at Hamilton? Well, it has only been running a year; and it is too early yet to say. Their half-year's balance-sheet from January to June showed a debit balance of £386. Oil cost £98; and wages and salaries, £182; while receipts from lighting were £66. But their next half-year's result should be much better, as many of the best customers only came on towards the close of the half year, and the borough lighting since. The Directors state that they are now paying their way.

If it be not presumption on my part to offer any advice to managers who are situated in towns the size of Hamilton, let me recommend that, if the opposition of electric lighting by a local

company be seriously entertained and likely to be gone on with, the better plan would be for the gas company to embrace the opportunity and run the two; for if they are to be successful, it should surely be by the running of the two concerns under one management. The gas-works would, by supplying gas to engines to generate electricity (unless a producer was installed), have a good customer in the power required for the opposing light. Then the more electricity used, the more gas would the engine consume. Thus, while some good customers might go over to electric lighting, they would not be altogether lost to the Company.

Another great recommendation for this amalgamation of the rival lights is the question of price. With two opposing Companies in a small place, cutting goes on for custom that is often below the margin of a fair price for the work required. Under the single management of the two rivals, a price could be quoted for contracts that would be paying, and would yield a decent living wage for all concerned. Municipally-owned gas-works are in a far better position to deal with electric companies trying to start against the corporation gas-works than gas companies are. The control of the streets is in the Council's hands, and they can decline the use of them to erect poles; and they would keep the street lighting in their own hands, for the sake of their gas-works.

Discussion.

The PRESIDENT said that, as a matter of fact, the manufacturers of electric lighting machinery, dynamos, &c., in the Home Country sent their agents out all over the world to find towns in which there was any prospect of supplying electricity. These agents sent home orders regardless of local conditions or whether or not the thing would pay.

Mr. FIGGIS said it was evident Mr. Bearup was feeling the pinch of electric competition; but he (Mr. Figgis) must say he wholly disagreed with the conclusions the writer had arrived at to recommend that smaller gas companies should run the electric and gas supplies under one management. He had very strong opposition in Ballarat from an electric lighting company; but he thought it was always well to take history for it. There was one small company that stood out as a beacon to all theorists in the gas profession against arriving at any such conclusion as Mr. Bearup's. The Rockhampton (Queensland) Gas Company had been supplying electricity as well as gas. They had put up plant at a cost, he understood, of from £15,000 to £20,000. This indicated that they had gone into the matter in a thoroughly businesslike way, employing a separate electrical engineer, &c. What was the result? The Company, prior to taking this step, was an exceedingly prosperous concern, and had accumulated a really good reserve fund amounting to some thousands of pounds. The result of running the electric light plant had been that the Company had made a loss every six months, which had absorbed the whole of the reserve. He believed he was right in saying that it was now "on the cards" that the Company would be giving up altogether the generation of electricity. Of course, there were certain towns where gas and electric light undertakings were run in conjunction. He might mention Perth, where the conjoined enterprises were working exceedingly successfully. There the electric lighting portion of the business paid better than the gas. But members would understand Mr. Bearup had been speaking of small companies; and it was against his conclusion regarding them that he (Mr. Figgis) was speaking. He thought it would be better if, instead of coming to that conclusion, managers of small companies would see by what means they could cheapen the production of gas. The question of dividends in face of that necessity, when there was any electric light competition, must be left out of consideration altogether. If needful, the shareholders must be educated up to the fact that they must forego their dividends if they wanted to quash the opposition. He would like to ask the members how many small electric companies paid dividends. Very few indeed when they first started. If small gas companies made up their minds that they would in every possible way, when faced with electricity competition, supply gas at the cheapest rates, he thought they would have very little to fear from it. It had now become a recognized fact that for household illumination electricity was not in the field; and if they pushed the sale for gas, they would find that they had very little to fear from electricity, whereas if they entered into the supply of this as well as of gas, neither would pay.

Mr. WARREN (Footscray) said he had several times been seriously threatened with electrical opposition; but he scarcely feared it. He almost looked upon it as welcome, because the history of electricity right through Great Britain and the Continent of Europe showed that the domestic cost was the consideration that was always to the front; and gas was cheaper than electricity, was always on hand, not dangerous, and more effective through being non-intermittent. There was one thing that a gas manager should do, and that was set to work and fit gas apparatus in people's houses for nothing, in order to get them to use gas. They laid gas in their streets very often in 10 or 12 inch pipes, found it very costly, and rated consumers with probably £10 or £20 a-piece for the expenditure. Would it not be wisdom on their part to dip their hands into their pockets a little deeper and put in the fittings? If the consumers wanted anything more elaborate than the company were prepared to supply free, they could purchase it themselves; but the companies could give them one light in the dining-room, another in the kitchen, and a small stove or griller, very cheaply to themselves. He had visited many country gas-works, from the Murray down to Melbourne, and had seen in nearly all these places that the managers used inferior coal. Why was this? It seemed to be retrograde. He had seen piles of small coal that would not yield 7000 or 8000 cubic feet of gas per ton; and these companies had to pay 7s. or 8s. a ton and railway freight for it, whereas they could get superior coal for 11s. or 12s. per ton.

Mr. BEAN (Wangaratta) said he had used small coal, but had got 11,000 cubic feet of gas per ton out of it, and much better coke than he had been able to obtain from the larger coal.

Mr. WARREN (continuing) said this was not his experience. With regard to fittings, as Mr. Figgis previously said, they must study cheapness in gas supply; and this had something to do with it. He contended that if they sent out quality in gas they would be able to fight electricity or any other form of lighting. A gentleman who was a good customer of the Metropolitan Gas Company, spending with them some £12 or £15 per annum, fixed outside his shop an arc light that cost him about £20, put out his window lights, and used electricity in his shop; but at the end of twelve months he found that, besides paying for electric light, he had to pay £10 or £12 for gas all the same, as he was using gas upstairs and in the back part of the shop. The consequence was that he did away with the electric light altogether. To fight electricity, he would advise them to keep their plant in the highest possible order, and supply the best quality gas; and the only way to get these results was to use the best coal.

Mr. G. SWINBURNE said the competition of gas with the electric light had been going on in Australia for a great many years, and he had met with it in a number of towns. Mr. Figgis had given his experience with this competition in Ballarat, Rockhampton, and Perth—proving that it varied from a great success in Perth to disastrous results in Rockhampton. At Charters Towers the gas supply was very successful, while the electric light was going to the wall. One point the members should be careful to bear in mind. He did not think they had anything to fear from electric lighting companies—they could beat them; but if they, as managers of gas companies, had to compete with municipalities who had their own electric light undertakings, they would suffer very materially, because so long as the Councils could make use of the municipal rates to keep the thing going, cover up the losses that always took place, and bring out a balance-sheet which showed a profit that could not be checked, the gas companies must in every instance suffer by losses of street lighting and some of the big consumers. The Councils were determined in such cases to make electric lighting a success by output, even if not in cash. They could supply the street-lamps at a nominal rate, and increase the lighting-rate in order to make the concern pay. The gas manager's advantage lay in always meeting them in regard to the lighting of streets. His policy would be, if threatened by municipal electric lighting, to work might and main to keep the street lighting, even if the gas had to be supplied at half price. He was mostly interested in small gas-works, excepting that he was a Director of the Melbourne Gas Company. But in Melbourne they felt the competition of the City Council most of all. They did not care a rap for the Suburban Company, as they could compete with them quite easily; but when it came to the Melbourne Corporation, it was a different manner. He had investigated the subject of electricity to see how it would pay in small towns, and had come to the conclusion that in a town like Hamilton it would be suicidal to start an electric supply. The shareholders would never get their money out of it again. It was like putting it into a bad mine. Electricity supply to small towns such as Wangaratta and Benalla would hardly pay, even without the existence of a gas company. He first came into public life in Australia simply through fighting a proposed electric lighting undertaking which the Hawthorn Council wished to enter into. He was dead-against it. He went into the political field and fought the man who was in favour of it, and beat him on the ground that an electric supply would never pay in a town unless it was a good big business centre. It was amusing to hear councillors declare how electricity would pay in such places as Wangaratta after experience with what could be done in centres like Glasgow, where there were 2 or 3 million inhabitants, instead of only 4000 or 5000 people. It was absurd. The large profits that were made by supplying electricity at places like Manchester, Sheffield, or Glasgow were due to the great industries that had to be run there with it, and the hundreds of thousands of inhabitants. They had now to be on the *qui vive* more than in the past, because electricity had come to stay, and was going to spread. Wherever they saw the slightest sign of electricity being put into operation, they should quash it by offering facilities for the use of gas. But what he rose particularly to point out was the great difference in competing with a company and with a municipal supply. If they had to compete with a municipality, they should threaten it, and meet it in every possible way; but if they had only company competition to face, they could snap their fingers at it.

[At this stage, the meeting adjourned for luncheon; and the members were hospitably entertained by the President at the Savoy Café. On resuming]

Mr. W. MORRIS (Seymour) said he agreed with Mr. Figgis in contending that Mr. Bearup was not right in saying that it would be a good thing for small towns to run the electric light with the gas supply. He thought, too, that the electric light company which had been started in Hamilton could hardly be a financial success. According to the paper, they were charging £1 per

lamp per annum. He supposed that in time the Company would have to put in meters, and then they would find that the cost would not compare at all favourably with gas. He thought it was only a matter of time before the electric light in Hamilton would be snuffed out.

Mr. BURALL (Warrnambool) said it had been suggested that, in order to combat electric lighting, shareholders in gas companies should for a time do without dividends. Unfortunately for him, they were working under statute law, and had to provide money to meet a loan raised at 7½ per cent. To some extent the loan was a protection, as the gas-works belonged to the Municipality, and the Council would rather pay a little extra for gas than see it worsted in competition. It was only by reducing the price of gas that gas companies could beat electricity.

Mr. HAWLEY (Brighton) said he happened to be Assistant Gas Manager in the town in England that was the first to be lighted by electricity; and he quite satisfied himself at the time what electric light competition was going to be, and had never troubled himself about it since. At that town the Brush Electric Light Company came along and took the street lighting contract, and carried it on for twelve months at a price a shade under what the Gas Company had been doing it for; but at the end of that time they wanted four times the amount to continue. The Council would not pay it, and the electric plant had to go. His candid opinion was that the more electric light there was the better it would be for gas companies.

Mr. HOLMES HUNT (Melbourne) said the members were very much indebted to Mr. Bearup for coming forward with his paper. At first sight he (Mr. Hunt) might take a little exception to its title, because large companies as well as small ones had to meet the special kind of competition referred to; and the bigger the Municipal Council they had to fight, the harder it would be. They in Melbourne undoubtedly felt electric light competition; but they did not object to it. Good competition was a very great safeguard to the consumer; and it also, as Mr. Hawley had said, acted as an incentive to gas people. The first thing that attracted his notice when he read the paper was the advertisement by the Hamilton Corporation. He did not know that it was really worth while speaking about, but it undoubtedly showed very great weakness on the part of the Council to publish such an advertisement, because in declining to consider the claims of gas they evidently recognized that it would give them a better service. There was no doubt at all that an electric wave, as it were, was now passing over Victoria, such as had passed over the Old Country. It was some years ago that it happened there; and there was not the faintest doubt that at the present moment the people at home were awake to the fact that, after all, gas was much better than electricity. Just before he left home, he had a conversation with the Engineer of one of the largest corporations in Europe. That gentleman had to advise on the lighting of the streets; and he had said to him (Mr. Hunt): "Every time I have to advise on the extension of lighting or the renewal of lighting in public thoroughfares, I always recommend gas, because it is more efficient and cheaper." In the meantime, it appeared to him (Mr. Hunt) that the best way to meet electric lighting opposition was the one Mr. Figgis had mentioned. If they could get the selling price of gas down, they need not fear anything from electric competition. To his mind, there was undoubtedly room for improvement in the price of gas in Victoria, although it was difficult to see how they were going to effect it straight away. When they came to look into the accounts and study the position, they would find that the high price was not owing to expensive coal, but mainly to over-capitalization. This was a thing that they could not alter. But they could try to bring down the price by extending the use of gas as far as possible, thereby increasing the consumption, and meeting all the expenses out of revenue. There was a point about the working of municipal lighting contracts that had always puzzled him. It was the custom in Melbourne and the surrounding districts to leave all gas-lamps unlighted during the full moon each month; but the electric public lamps were continued every night during the year. If municipalities wanted their thoroughfares lighted every night and all night with electricity as the illuminant, why not so with gas? Mr. Bearup had mentioned the advantages of electric lighting. He (Mr. Hunt) was not one of those men who would not admit that the electric light had all the advantages enumerated. He was quite prepared to take up the position that there was room for both gas and electric lighting on fair grounds. The distance lighting, as it was sometimes called, which could be done by pressing a button or turning a handle as one entered a room, was very convenient; but equal advantages could now be obtained with gas supply by means of a pneumatic arrangement which could be fitted in any part of the room. He was, however, looking to the electricians for a good solution of distance lighting for gas, as he felt the most reliable appliance ought to come from this source. He was very sorry to see that several inventions which he had inspected in the Old Country had not been perfected. As regards lighting public thoroughfares, he hoped that before long there would be a reliable means of lighting gas-lamps automatically. There were fixed on the lamps at home burners which were controlled as the pressure was either raised or lowered at the works. They had been trying in Melbourne an appliance which was rather different from the home one—it was an Australian invention—and they were so satisfied with the trials they had made with it that they were now going to fix it up on a larger scale. If it proved successful, perhaps when their next meeting took place he might be able to tell them more about it, and show them a larger number of installations of the apparatus than they had in immediate contemplation. So there was a chance of their being able to meet this point in the competition of the electricians by raising the pressure at the governors for a few minutes mornings and evenings, thus getting their lamps lighted and turned off without having a man running round to do it.

Mr. BEAN (Wangaratta) said he had tried a method of lighting and extinguishing lamps which was worked by alteration of pressure. It acted very well when one could regulate the pressure; but in his district there were some places where this was considerably lower at night than in the daytime. This was a difficulty which they would have to overcome in connection with distance lighting.

Mr. HOWLETT (South Melbourne) said they must all sympathize with Mr. Bearup, who undoubtedly had had, and was still having, a hard fight; but he (Mr. Howlett) was afraid Mr. Bearup was inclined to view electric light competition in a much stronger way than was necessary. If he let the consideration of the electric light slide a bit, and paid more attention to the gas he was making, he need not worry so much, and would find that he would overcome some of the difficulties. His advice was to get the consumers into such good form, in the way of being satisfied with gas, that there need be no fear of electric light competition. He thought it would be better if managers could induce their Directors to let them get their works into good order, and then get rid of all open-flame lights, and try to introduce the incandescent burners; then perhaps, while lowering their candle power, they would supply as good a light at less cost than they were doing at the present time. There was no doubt that if they could get an inflammable gas with a heating value of between 500 and 600 calories, it would far exceed that which was now being provided in any country town, if mantles were used. If they gave the people a good light, they would not have much to do with travellers who came into their town to try and ring in electric lighting. He hoped Mr. Bearup, after hearing the remarks from his comrades, would show that, if his townspeople stuck to gas, he could give them a good light and up-to-date appliances.

Mr. MARSH (Mentone) said that, as automatic lighting had been touched upon, he might mention that he had been lighting 73 lamps automatically for twelve months. It was time-set automatic lighting; he lit them all up at one time, and they all went out together. The arrangement saved two hours every day, and they had been able to reduce their expenses by £26 a year—the wages that would have had to be paid to a lamplighter.

The PRESIDENT asked whether they had to attend to the machines every day.

Mr. MARSH replied that they had; but he said it was also necessary to look to the lamps every day, to keep them in order, clean them, or put on new mantles or chimneys. He had found it a great success.

Mr. HUNT said the point that Mr. Bean had raised about the pressure might be referred to. With the apparatus he had in mind, there was not much question about low pressure so long as one could get the high pressure. With a pressure of say 30-10ths at lighting up time and 30-10ths at turning out time, the intervening pressure did not affect the matter.

Mr. BEAN said that at sunset the pressure in part of his district went down. During the day they had 15-10ths on a particular main; but considerably before sunset this dropped—necessitating his immediately putting on further pressure at the works. He found that, when he put on 27-10ths, when he went to the main there was only 12-10ths pressure.

Mr. HUNT asked whether the main was large enough.

Mr. BEAN said it was, and it was also lower than the gas-works. This was one of the difficulties he had met with in automatic lighting.

Mr. FROST (Beechworth), referring to the subject of the paper, said he agreed with the remarks of Mr. Howlett, more especially in reference to gas managers making themselves popular with their customers. When he first went to Beechworth, they had no street lighting. The Municipal Council were opposed to gas, and a good many of the prominent residents were prejudiced against it. Their present plant was unique, so far as Australia was concerned; indeed, he did not think there was a plant like it in the world. He, however, tried to make gas as popular as possible; and at the first meeting he told his Directors he thought he could guarantee that, before another twelve months passed, they would have the town lighted. It was rather presumptuous on his part, but he managed it. In less than eight months he had 32 lamps going, and since then they had increased. There was nothing against the gas at Beechworth but prejudice. He had not one open-flame burner in the town, they were all incandescent. If there was a new thing coming round in the way of burners, they tried it. This was the only way by which they had battled against the electric light agents, who had tried on three occasions to induce the townspeople to support an electric light supply. Until the next excitement arose, they were on *terra firma*, and did not care a snap of the finger for the electric light.

Mr. BEARUP (who had joined the meeting) said he was sorry he was absent during the first portion of the discussion on his paper. Referring to the remarks of Mr. Figgis, who, he understood, said that it was much better for small gas companies to keep clear of taking on the electric light—quoting the experience of the Rockhampton Gas Company—he said that what he had stated was

news to him. He was pleased to hear that the Rockhampton Company were thinking of not further undertaking the supply of electric light through not making a success of it. This should keep them from amalgamating with electric light companies. The hours of lighting in the country towns were rather different from those in large cities. In Hamilton, they had no shops open after nine o'clock in winter. There was a weekly Wednesday half-holiday, when all the shops must close at one o'clock. In summer time all of them had to close at half-past nine, except on Saturday nights. This meant that they only had one long night's lighting in the week. Something had been said about distance lighting. This involved keeping a pilot light. In shops they would not have one—he had tried it. What induced him to suggest amalgamation was that he had a friend connected with the Perth Gas Company—a concern which undertook both gas and electric lighting, and which paid more handsomely in the electric than in the gas department. Of course, the Perth Company had everything under their own control, and could charge practically what they pleased. It was always an inducement to amalgamation that they had the prices in their own hands. So far as getting on well with the public was concerned, he (Mr. Bearup) had no enemy that he knew of in the town. But some people were not satisfied with gas, and said there was nothing like electric light. People of this sort were induced to take shares in the Electric Light Company. Some of them were leading business men; and consequently they had lost them as customers, because they at once said, "We must support our own Company." It had been suggested that they should put up some gas-lamps that would show what could be done with gas at high pressure. They ran a 750-candle lamp for two years for nothing before the Electric Light Company started. In fact, they ran three large lights for the Borough Council without charge for two years; but this did not stop them going in for electric light. The Gas Company tried hard to show the public that they could get a good light from gas; but some people thought that nothing but electric light would do. He was pleased to find his paper had given rise to a good discussion, as he did not think a paper was of any use if nothing was said about it. Most of the members differed in some way; and consequently the debate had been of some benefit.

Mr. W. W. Morris (Seymour) then read a paper on

SELLING GAS.

I have heard it said that in bygone days the manger of a gas company was not very particular as to whether he pleased or displeased a consumer; his method being, "Take it or leave it, whichever you like." This was decidedly before my day, as it is a style of which I have seen absolutely nothing. At the present time, instead of transacting business on these lines, the gas manager must actually run after the consumer, and canvass him in every possible way; using the whole of his personal influence for the good of the business he represents.

The manager of a small works has undoubtedly the advantage over his brother in the larger works, inasmuch as he is personally known to every consumer, and to many who are not consumers. He must therefore never forget to press home, on every possible occasion, the advantages of gas for lighting, motive power, and fuel, as it is a very true saying that "Constant dripping wears away even the hardest stone." He must make himself familiar with all the latest things in gas appliances, as many are caught by the novelty of a new burner, mantle, &c. He must also be able to give advice on any matter in connection with his profession, so that the intending consumer may not invest in some worthless appliance which will ever afterwards be a nuisance to himself and the manager, whom, assuredly, he will blame for supplying bad gas whenever anything is out of order.

It is to our advantage to see that the consumer is getting the full benefit from his fittings. In the matter of ordinary burners, it does undoubtedly pay to supply the best free of charge. The manager who carries a few good burners in his pocket can practically demonstrate at any time when the quality of his gas is doubted, by removing an old worn-out burner and replacing it by a good one of moderate size, that it is the method of using it, and not the gas, that is at fault.

As nowadays ordinary burners are rather the exception than the rule, I think that the time has come when we should replace mantles, or even fix incandescent burners, supplying them absolutely free of charge—at any rate, where the consumer complains of his light, and will not have it rectified on the score of expense. Little things like these go a very long way with some consumers; and as we have now so many competitors—electric light in the large towns, acetylene in the small, and kerosene in both—we must look to the gross result. If we can retain a consumer by supplying these things, and keep out our opponents, we have achieved more than the worth of the gift.

I have said that the country manager has an advantage over the town manager; but, on the other hand, the town manager has an enormous advantage over the country manager, in the fact that his gas is reasonably cheap. A far greater advantage, however—almost an incalculable one—lies within his reach. He can adopt the prepayment meter, by which he can reach a multitude of people who would otherwise never become consumers. The prepayment meter has gone far beyond the experimental stage, and has proved over and over again to open up entirely new fields for the development of the gas industry; and yet many managers leave this important boon severely alone.

Of course, in the case of the smaller works (to which I belong) it cannot be worked to any advantage, as the high price of gas prohibits it being dealt out in pennyworths; but with larger works, where a minimum of (say) 14 cubic feet for 1d. can be given, it is well worth trying. By fitting up a house with a pendant, two brackets, and a boiling ring, and charging (say) a maximum of 1s. per 1000 cubic feet over the ordinary meter, a good return may be had on the investment. I do not advocate the indiscriminate fixing of stoves free; a boiling ring suffices in the majority of cases. In my personal experience in the South of England, I found that very many consumers took advantage of the stove being supplied free, but never used the oven at all. A large number of these we had subsequently to remove, and generally found them in a very neglected condition. On the other hand, the boiling-rings were invariably used (in some cases only to boil the kettle in the morning, while the fire was lighting); and they paid well. With regard to stoves, we afterwards adopted the hire-purchase system, which we found to work out very well, as the purchaser, knowing that the stove would eventually become his own, took good care of it.

It hardly comes within the scope of this paper; but as it is a matter closely connected with the slot-meter, perhaps I may be pardoned for mentioning an appliance for facilitating the counting of coins. It is the invention of Mr. Wimhurst, and is in the form of a V-shaped aluminium tray, with the discharge just large enough for a penny to go through, set at the best angle for quickly passing the coins from the tray into the bags. It is padded underneath with rubber to prevent it slipping.

Finally, it is my opinion that we should let as much light into the working of our undertakings as possible. Many people are entirely ignorant of our commodity. Really intelligent people say, "What is a bigger liar than a gas-meter?" and talk of our putting in quantities of air to sell instead of gas. I believe in explaining to them the construction of a meter (showing what an accurate measure it is), the fact that 5 per cent. of air reduces the illuminating power of the gas by at least 33 per cent., the principle of the bunsen burner, &c. Our aim should be to sell gas as cheaply as possible (not being too particular as to it being of high candle power, as this is not of such paramount importance since the advent of the incandescent burner); supply incandescent burners at cost price—or even free (as it is the profit on gas we want to obtain, not on fittings); adopt the slot-meter wherever practicable, and push it for all it is worth; give a ready ear to consumers' complaints; and, in fact, create in them the desire for better and more light. We should thus be able to prove that, although electricity was said thirty years ago to be the light of the future, it is still the light of the future, but gas is, and will long continue to be, the light of the present.

Discussion.

The President remarked that Mr. Morris had not said anything about the price of his gas; and this might be an important factor.

Mr. Morris replied that the price of gas at Seymour was 12s. 6d. per 1000 cubic feet.

The Chairman said it had been a feature of the discussion that morning that they should reduce the price of gas if possible. He supposed 12s. 6d. was about the highest figure quoted.

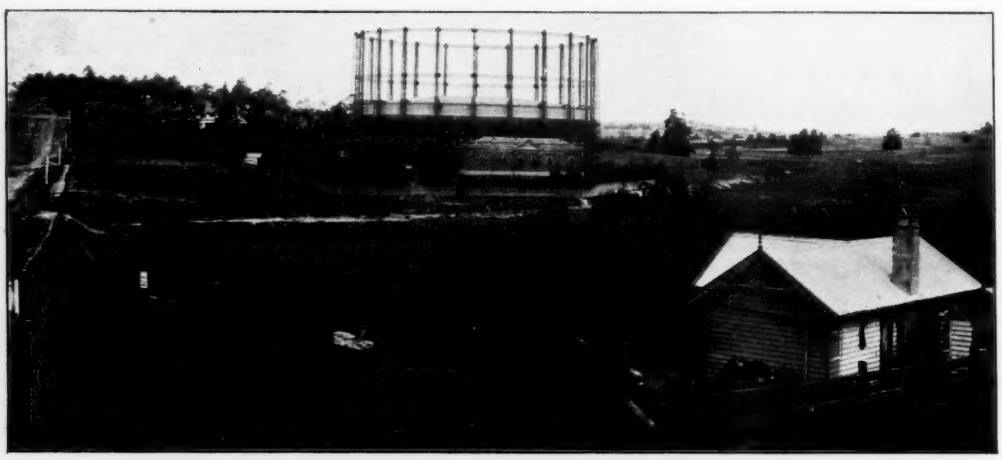
Mr. Frost (Beechworth) said that, as compared with coal gas, his price was only 8s. 9d. They were turning out oil gas of about 36-candle power, and consequently they reduced the consumption.

Mr. B. Lord remarked that in Maryborough the price was from 8s. to 10s. per 1000 cubic feet.

Mr. Hawley (Brighton) said that for lighting they charged 6s. 8d., and for cooking 5s. 5d. They gave 4d. discount if consumers paid at the office before the 10th of every month, and so saved the cost of collection. Collecting cost 3d. per 1000 feet, so that they did not lose much by giving this discount. If he could only sell his gas as cheaply for cooking in Sandringham as they could in Melbourne, he would be all right. Slot-meters were charged the same prices, but they allowed discount. The slot-meters were only put out for risky ventures, with the idea of getting the money in. Of course, the incandescent light was a great advantage. For two or three years he had sold a very good incandescent burner with an opaline chimney at 2s. fixed. He sold mantles at 6d. singly, and cheaper by the dozen. The great thing was to sell gas cheaply. Unfortunately, their prices—what with over-capitalization, &c.—were too high; otherwise they could do far more business. While he was on his feet, he might make a few remarks about what Mr. Warren said as to giving good-quality gas. He wished to turn his concern into a coke company, and the gas and tar would have to be residuals in the long run. He wanted to bring the quality of the gas down. He did not trouble what the output per ton was. He wished to know what money he could get out of the coal; and he schemed to get as much as he could in every possible way. They must bring down the net cost of production, He was using wood with his coal, for the purpose of bringing down the quality, not bringing it up. When he was in New Zealand, he was getting more for his coke and tar than the coal came to. He had a connection made, so that when the holders were full, he could turn the gas into the furnace. They should all strive to bring down the cost of production and sell gas cheaply, taking charge of incandescent burners.

Mr. HOLMES HUNT (Melbourne) said he took it that the object of the paper was to set forth the best ways of selling gas; and he thought from reading it through they might take it that Mr. Morris had two chief methods. The first was to employ everything up-to-date that they could get to encourage the consumers in the use of new appliances; and the second was to use slot meters. It appeared to him that the first method had to be carried out everywhere—that was to say, they must keep in touch with their consumers, whether they ran a big company with 60,000 customers or a small one with only 400. But he could not follow Mr. Morris's argument about the prepayment meter being solely an advantage for large companies. He would like to know what he was really doing in the matter of prepayment gas-meters at Seymour. Mr. Morris ought to be able to sell gas by means of shilling slot-meters, on similar lines to penny prepayment meters in Melbourne. The slot-meter, as they all probably knew, had been lately introduced into Melbourne on a system similar to that adopted by another gas undertaking in Australia and in most of the towns in England. In Melbourne, they were putting in installations in houses at the rate of sixty per week at present; and the meters were adjusted to give 15 cubic feet for 1d. They were putting all the fittings in order, piping the houses when necessary, adding new fittings in the way of brackets or pendants if so desired, and putting in grillers in the kitchens. They were also fitting up incandescent burners. He thought this was the first system of slot-meter installations which included that. At any rate, he had not heard of any other. When he came to Melbourne, he found that they had to contend against kerosene lighting, which was practically the only lighting of small householders. They had to give the people a better light than kerosene—which would be practically equal to a flat-flame burner—or else he realized they should not get on, having regard to the selling price. Therefore they put in an incandescent burner with each slot installation, and, what was more, supplied each with a mantle every six months. They had over 4000 installations fixed at the present moment. They were proving a great boon to the smaller householders. He believed it was said that one often had to go abroad for news of home. He had read only recently a paragraph taken from the "Ironmonger," which referred to what was stated to have been done in Melbourne regarding slot installations. It was said that people were using the meters as money-boxes. There were one or two isolated cases of this being done; but it had by no means become the general thing that it was at home. The writer also referred to the flat flames which the slot customers were using. He would repeat that one of the features of the installation was the incandescent burner, though, of course, any extra burners supplied free were flat flames. But in many instances the consumers were purchasing additional incandescents. He was very much in accord with Mr. Hawley in saying that they wanted to get down to a low-grade gas. The low-grade gas produced by a combination of wood and coal was a matter that he should be interested to know something about. He hoped that Mr. Hawley would not only tell them more about it, but that he would allow them on some future occasion to visit his works and see the plant and method that he was using for producing his gas.

Mr. WARREN (Footscray) said he believed he was the first one to introduce the slot-meter into Victoria and Australia. It was very successful, and many companies wrote to him to ask for the benefit of his experience in the matter. He met with a drawback some time ago which made him almost resolve to use no more of them. Thieves got on to the verandahs where they were fixed, wrenched the locks off the meters, and made away with the money. This had given them a lot of trouble. They supplied the slot meters because they wanted to sell their gas in houses which were lighted with dingy kerosene lamps that only made darkness visible; and they also wanted to get slot meters put into houses occupied by people from whom they had difficulty in getting money. When at length he caught one of the thieves red-handed, the magistrate told him that he ought to have had the meters put in boxes inside the houses. The introduction of the penny-in-the-slot meter was a great advantage in the towns and cities of Victoria. They had to go round to them once a month or once a quarter only; and he thought there was a saving in the selling of gas. A ton of coal went up to Seymour for about 10s. or very little over. That was 1s. more in freight than it cost to go to Footscray. Would it not be better for Mr. Morris to reduce the price of his gas to about 8s., and secure double the custom? Of course, he did not want coke, because they had got wood; and perhaps coke accumulated on their hands as dead stock. At Seymour, 200 to 300 consumers, he supposed, would be the maximum.



The Tooronga Holder of the Melbourne Gas Company.

Mr. MORRIS answered that it was less than that.

Mr. WARREN said that was no doubt the reason for keeping up the price. If they put in slot-meters, they could do better.

The CHAIRMAN said that they ought to move a vote of thanks to the readers of the papers, which had been well discussed. With what Mr. Warren had to say about high-quality gas, and Mr. Hawley about low-quality gas, he thought the debate had been very useful. He had a friend who had told him that he was submitting to Mr. Swinburne—as Minister—a scheme for Government electric lighting by water power that would permit him to bring current to Melbourne and Ballarat cheaper than was being done now. So they were to have fresh competition; and Mr. Figgis also would have a new competitor.

Mr. MORRIS said that a question had been asked as to the price of the installation of the slot-meter. He knew that in the South of England it ran into about £3, with two pendants and a bracket, &c. Perhaps Mr. Hunt could tell them more exactly. As regarded the use of slot-meters as money-boxes, he had taken as many as twenty meters in the course of a day in England in which 2s. pieces had been inserted instead of pennies. He understood Mr. Warren to say something about receipts. They never gave a receipt for a slot-meter. People would be taken aback to find that they had put so many pennies in, and it was as well to keep them in ignorance by not giving them receipts.

The PRESIDENT proposed a vote of thanks to Mr. Bearup and Mr. Morris for their papers; and it was carried by acclamation.

THE NEW OFFICE-BEARERS.

The election of officers was next proceeded with; the following being unanimously chosen:—

President.—Hon. George Swinburne, M.L.A.
Vice-President.—Mr. S. E. Figgis (Ballarat).
Member of Council.—Mr. W. Hawley (Brighton).

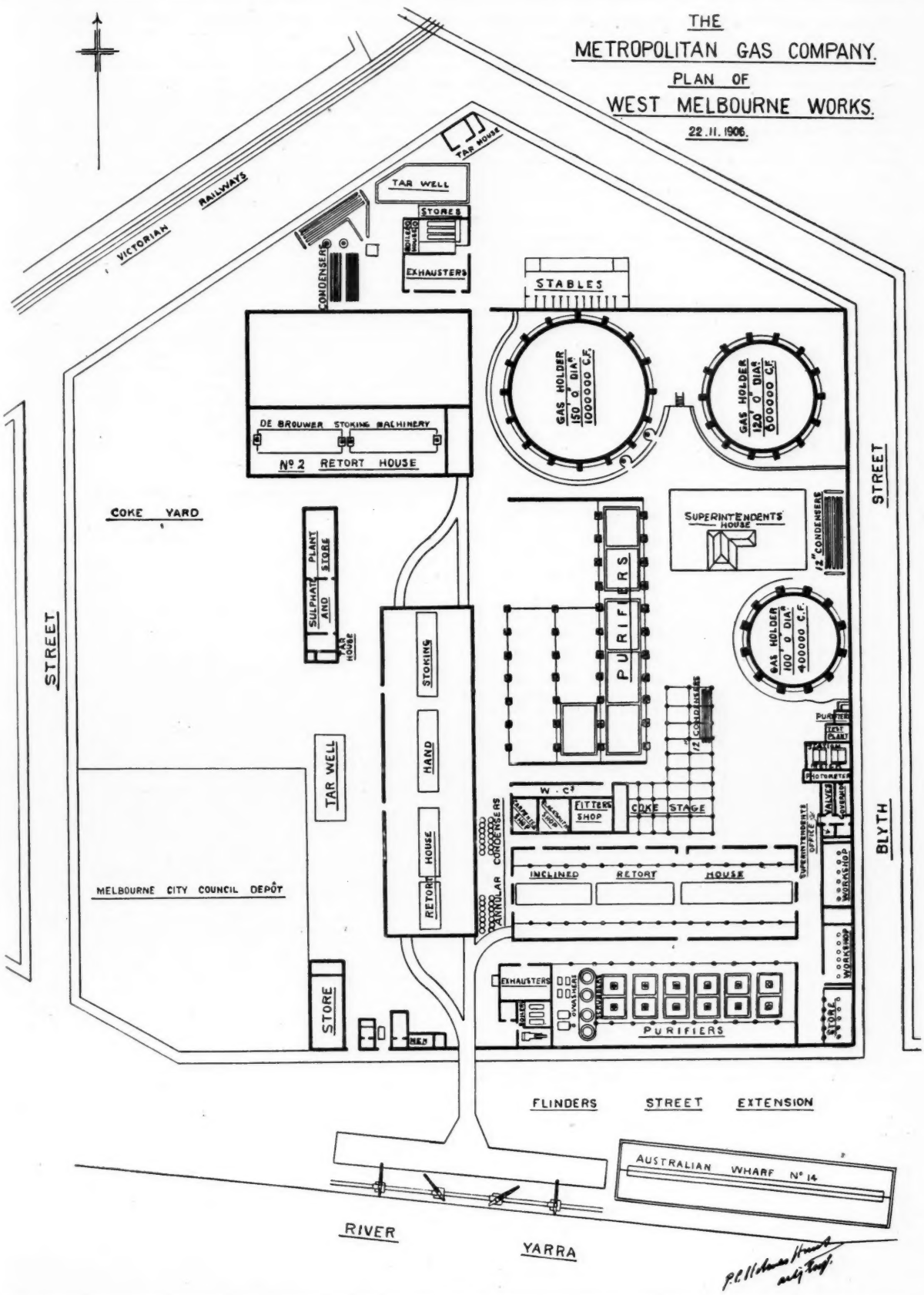
It was also decided to hold the next meeting in Melbourne.

The proceedings terminated with a hearty vote of thanks to the President for the excellent manner in which he had filled his office.

VISIT TO THE MELBOURNE GAS-WORKS.

The following day, a visit was paid to the West Melbourne works of the Metropolitan Gas Company and also to the Tooronga out-station; the Association being the guests of the Company for the day. The members assembled at ten o'clock at the Gas Offices, and were driven to the West Melbourne works; the new President (Mr. G. Swinburne, who is a Director of the Company) and the retiring President (Mr. R. O. Thompson, their Consulting Engineer) accompanying the party.

On arriving at the works, the members were met by the Company's Acting Engineer (Mr. P. C. Holmes Hunt) and the Works Superintendent (Mr. J. W. Thompson), who showed them over the station. The works are situated on the north bank of the River Yarra, about a mile from the centre of the city, and the gas made is distributed in the northern suburbs and the city proper. The



Company have their own coal wharf, on which is erected a viaduct connected to the works by a bridge crossing the roadway between the river and the works; on this runs a narrow-gauge railway, extending through the retort-houses and into the various coal stores. The coal is unloaded direct from the steamers at the rate of 120 tons per hour by four hydraulic cranes into the trucks on the viaduct, and conveyed to the various places of discharge by two steam locomotives. One of Messrs. John Abbot and Co.'s 60 N.H.P. hydraulic pumping-engines, with an accumulator pressure of 750 lbs. per square inch, provides the necessary power for working the cranes, capstans, &c.

There are three retort-houses. No. 1 contains 175 inclined D retorts, set in beds of seven, heated by regenerative furnaces. The coal breakers, elevators, and conveyors, with the overhead hoppers, measuring chambers, and charging-shoots, were supplied by the New Conveyor Company, and erected under the supervision of the Company's Engineer in 1902. No. 2 house is at present undergoing reconstruction, and round this the interest of the visitors mostly centred. Sixteen beds of horizontal retorts, in settings of eight, are being erected; and it is intended to instal a De Brouwer projector and discharger for working them—an electrical power-house being provided close by. Owing to the

treacherous nature of the subsoil at these works, considerable difficulty has been experienced in regard to the foundations; but the whole of the settings are being built on a raft of reinforced concrete 204 feet by 30 feet. A coal-store of 8000 tons capacity adjoins the house. In No. 3 house there are 189 horizontal oval retorts, set in beds of seven, direct fired; the retorts being charged and drawn by hand. This house is kept as a stand-by, and also utilized as a coal-store.

On the south side of No. 1 retort-house is a brick building containing four Livesey washers, two "Standard" washers, four Dempster tower scrubbers, and three sets of four purifiers standing on an elevated floor, with an oxide-revivifying floor underneath, and also hydraulic lifts for raising the oxide. On the north side are the smiths' and fittings shops. On the north side of No. 2 retort-house is an engine and exhauster house, in which there are two horizontal engines driving two sets of Beale's rotary exhausters, each pair of 160,000 cubic feet capacity, and three Lancashire boilers, each 30 feet long and 7 feet diameter. Behind the engine and boiler house there is a set of horizontal pipe condensers, two of Cutler's "Perfect" water condensers, and one of Walker's purifying machines. There is also an underground tar-tank with storage capacity for 240,000 gallons. On the east side of No. 3 retort-house there are two sets of annular condensers and a large purifying-house with six 50 ft. by 40 ft. purifiers on the ground floor, arranged with hydraulic power for lifting the covers and elevating the oxide to an overhead floor. On the west side are two underground tar and liquor tanks to contain 220,000 gallons; and here also is the sulphate of ammonia plant, consisting of two complete units.

There are three two-lift gasholders, with a total capacity of 2,200,000 cubic feet, with an out-station holder of 3,000,000 cubic feet capacity.

The Superintendent's office, experimental plant, and drawing offices are placed on the east side of the works, together with the station meter, valve, and governor house; and adjoining are the photometer-rooms and the laboratory.

About 48,000 tons of coal are carbonized annually at these works.

The inspection over, the members were taken in conveyances to the gasholder at Tooronga—an out-station situated in the outer suburb of Malvern. On arriving, they were entertained at luncheon by the Company—Mr. Swinburne being in the chair.

After luncheon, Mr. Thompson read a few notes descriptive of the holder, and explained that the Company purchased the land in 1890, the original intention being to build a small gasholder. Ultimately, however, a 3 million cubic feet holder was decided upon. The tank is 200 feet in diameter and 36 feet deep; the top of the tank coping being 12 feet above datum, in order to provide against storm waters. The holder itself, which is in three lifts, was erected by Messrs. Clayton, Son, and Co., Limited, of Leeds; and all the material was delivered on the site by a specially constructed branch railway. The engine and exhauster house contains two sets of 80,000 cubic feet per hour exhausters, driven by two 12 H.P. Crossley gas-engines; the gas being drawn from the South Melbourne works—a distance of some six miles—through a 24-inch main, and pumped into the holder. From this station gas is distributed to the different suburbs through 24-inch governors of Cowan's make.

Mr. Thompson proposed "The Health of the Metropolitan Gas Company," coupled with the name of Mr. Swinburne, and referred to the great interest this gentleman had always shown in gas matters. In reply, Mr. Swinburne referred to the encouragement the Association warranted, and said the Companies with whom he was connected had determined to do all in their power to promote its interests and encourage gas managers to join.

Mr. John Hinde (the Secretary to the Company) also replied.

The proceedings terminated with votes of thanks to the Council and the Hon. Secretary, which were duly responded to.

On leaving the marquee, the members inspected the holder and the engine-house; and they were subsequently driven back to Melbourne after an enjoyable outing.

STRAIGHTENING A TALL CHIMNEY.

An unusual method of foundation reinforcement was recently adopted to stop the settlement and straighten a large brick chimney at the Detroit (Mich.) works of the Solvay Process Company. The chimney is a 250-feet circular brick one, with an interior diameter of 20 feet, which serves the boilers of the power plant at the works. The foundation as originally built was of concrete, about 50 feet square, resting on clay at a level about 16 feet below the surface. Above this the solid masonry base of the stack rises to a point about 10 feet above the ground, where the brickwork commences. Two years after the erection of the chimney, it had settled more than 1 foot—one side about 6 inches more than the other. As it appeared probable that further settlement would follow, a firm of engineers was called in to suggest a method of stopping it, and, if possible, to re-align the structure. After examination, the following method was adopted, according to "Engineering Record," and it has been carried out in all essential particulars.

The foundation was found to have a bearing area of 2444 square feet on a clay which, while of ordinary firmness, might admit of further settlement under the weight of the chimney. It was accordingly decided to spread the foundation somewhat on two sides, with the greater widening on the side which had settled the most; so that if further slight settlement should ensue, it would tend to throw the stack back into a vertical position. This was accomplished by building extension footings of concrete outside the masonry foundation, and bonding the extensions to the main structure by cutting slots into the latter just below the ground level, into which the concrete extensions were grouted with steel reinforcement. The slots were about 2 ft. 6 in. deep and the same height; and the reinforcement planned was of 12-inch I-beams, about 6 feet long, spaced on 16-inch centres. The concrete extension footings were installed with considerable care, in sections 6 or 8 feet long; the concrete being firmly rammed into place. The footings were 10 feet wide at the base, and on the easterly side extended the width of the original foundation only; while on the westerly side, towards which the stack had leaned, they were carried the full length of that side and round at the ends for a considerable distance. The total area of new footings planned was 1480 square feet, of which the section on the westerly side had an area of 970 square feet, and that on the easterly side an area of 510 square feet. The remainder on this side has been omitted for the present, to give the chimney a chance to settle back plumb. After that the footings on the easterly side may be increased to the extent planned, or even more. The total bearing area of the extended foundation is now 3414 square feet. Our contemporary says that the expectation of the engineers has been fully realized, and the chimney now stands secure.

REPAIRING A CRACKED GASHOLDER TANK.

A recent issue of the "Journal für Gasbeleuchtung" contained a note by Herr Nebendahl, of Wandsbeck, describing the manner in which he succeeded in making sound the gasholder tank on his works. The tank—98 feet in diameter and 26 feet high—was built, in 1891, of rammed concrete. In the summer of 1897, it began to leak a little; but in November of that year it suddenly developed an oblique crack, and lost water at an average rate of some 11,000 gallons per day. As the holder could not be thrown out of action, and the leak appeared to endanger the works, a hoop of wrought iron, about 5 inches wide by 0·6 inch thick, was tightened round the projecting piers of the concrete tank, some 3 feet below the rim; wedges being driven between the hoop and the panels of the tank, and the whole filled up with concrete. By allowing all the condensing water, &c., to flow into the tank, and by constantly adding sawdust, stable refuse, fibrous matter, and the like, it was found possible to keep the tank full to within 3 feet of the top until the end of the busy season. The following May, as the leak was no better, the ground round the crack was dug out to a depth of 21 feet, and the crack itself, which was nearly 0·1 inch wide at the top, was cut out for a width of 2 feet almost right through the concrete from the exterior to the interior surface. The opening was next filled with new material, and the cement was left for about three weeks to harden. The tank then remained perfectly tight until July, 1903, when a small leakage developed again. By the end of the following October, the leak had attained its original magnitude—a crack appearing at the side of the fresh concrete. Finding himself in the same position as before, Herr Nebendahl determined to try the effect of some more flexible material. He ran the water in the tank down as far as he could, and painted the interior face with hot tar—making a patch 20 inches wide and 8 feet deep round the crack, and covering it with coarse sacking, to which more tar was applied. The operation was repeated until a "plaster" composed of three thicknesses of sacking and four of tar was obtained, the whole being about 0·3 inch thick. With periodical additions of water and fibrous matter, the holder was kept in action till May, 1904, when the tank was emptied to 5 feet from the bottom, without unsealing the bell, and the patch was examined. As it appeared to be perfectly sound, except at a few spots where the tar had not properly dried, a new "plaster," prepared in the same way, was put on, reaching from the rim to the bottom of the crack in the concrete. This new patch has lasted to the present time, and does not permit of any leakage. The renewal of the concrete on the first occasion cost some £110, and occupied about a month of labour; whereas the tar patch was applied in two days, at a cost of £6.

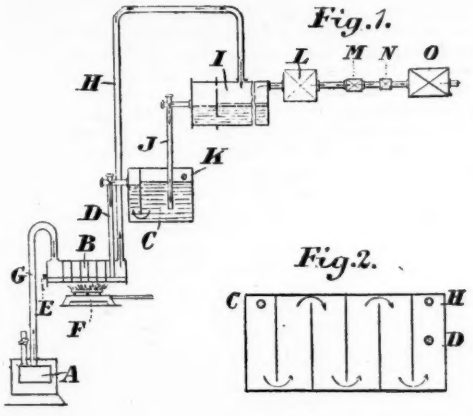
The Institution of Mechanical Engineers will resume, at the ordinary general meeting to be held next Friday, the adjourned discussion of the paper on the "Indoor and Outdoor Lighting of Railway Premises," which Mr. Henry Fowler, of Derby, read last month.

The Yorkshire Junior Gas Association will hold a meeting next Saturday, at the Municipal Technical School, Halifax, when Mr. J. H. R. Appleyard, B.Sc., will deliver a lecture on "Ordnance Maps: What they Teach Us, and How to Read Them." It is pointed out that this is one of the subjects referred to by Mr. Thomas Newbigging in his address to the Association at the annual meeting last October.

INCREASING THE PRODUCTION OF GAS.

The Blanc and Caton Process.

A French patent has been taken out by MM. Blanc and Caton for a process for increasing the yield of gas and for effecting automatically the revivification of the purifying materials. It consists in recovering the illuminating hydrocarbons in the tar, conveying them, by means of an injected current of air, into the gas in course of manufacture, and enriching the produced gas by benzol or other material rich in hydrocarbon; the effect of the series of operations being, it is claimed, an increase ranging from 12 to 20 per cent. in the quantity of gas produced without affecting its illuminating power. The method of regulating the quantity of air to be introduced is a simple one. An ordinary gas-meter, furnished with a suitable dial, is fixed upon an air intake. After passing through the meter, the air is led into an apparatus fitted with partitions—a "saturator"—into which falls the tar taken out of the gas. In the saturator the tar is brought to a suitable temperature to enable it to undergo semi-distillation, to extract from it its light-giving hydrocarbons. The temperature must not, however, be lower than 200° C. (392° Fahr.), so as to avoid the formation of solid lumps of viscous material. The air passing from the meter into the saturator is consequently charged quite naturally with the hydrocarbons thrown off by the hot tar; and the air acts as the vehicle for conveying them, by suitable means, into the hydraulic main, where they mix with the hydrocarbons held in suspension in the gas contained therein. The saturation of the carburetted air is completed by the introduction, by means of a drop-counting distributing apparatus fixed after the exhauster, of a small quantity of benzol, or other material rich in hydrocarbon, proportionate to the bulk of gas made.

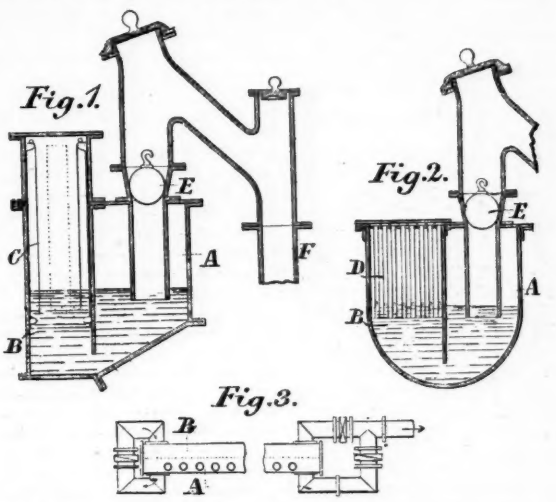


The accompanying illustration represents the arrangement of the various portions of the apparatus to carry out the invention. In fig. 1, A is the air-meter, B the saturator (a horizontal section of which is shown in fig. 2), C the tar vessel, receiving, by means of the pipe J, the tar from the hydraulic main I, and discharging it by the pipe D into the saturator, whence it is removed by the pipe E; the liquor being taken off at K. The saturator may be heated by the special device F, or, in small works, by the waste heat from the retort-furnaces. The air passes from the meter by the pipe G into the saturator, and thence by the pipe H to the hydraulic main, from which it flows on to the purifier L and to the exhauster M; after which point it receives the additional benzol from the distributor N, passes into the purifiers O, and finally into the gasholder. The arrangement shown is only suggestive, as the process may be carried out in several ways. The object in adding benzol at the point N is primarily to ensure the proper illuminating power of the gas, irrespective of any variations that may take place in the manufacturing process; but it also has the effect of correcting the tendency to deposition of naphthalene.

An important advantage claimed for the process is that, by the introduction of carburetted air into the gas before it passes into the purifiers, it is possible to have continuous automatic revivification of the oxides. The present system of exposing the material to the air, or alternatively of allowing the air to act upon it *in situ*, not only entails expense for labour, motive power, and extra plant, but causes loss of time while the purifiers are out of action. Moreover, there is danger of fire resulting from excessive heating. By the introduction of carburetted air in the manner described, these inconveniences are avoided. In fact, revivification being effected simultaneously with purification, no stoppage of work is necessary until the material is completely spent. With the view of preventing the drying and subsequent hardening of the oxide, it should be moistened from time to time, either by raising the lids and sprinkling it, or, better still, by injecting steam at the bottom of the purifiers. But in order to obtain the best results, it is preferable to work with natural oxides of homogeneous composition, and to regulate the speed of the gas in its passage through the purifiers so that it does not ever exceed 12 inches per minute.

COMBINED CONDENSER AND HYDRAULIC MAIN.

With the view of preserving the maximum illuminating power of gas, study and practice have led to the laying down of certain conditions for good condensation; and one of these is that the greater portion of the tar must be removed hot, and contact of the gas with the products of condensation avoided. The plant now in general use, though giving good results, is considered by some to inadequately fulfil this condition. In the foul main, which is usually circular and of large section, only the gaseous molecules near the bottom deposit tar; the principal portion of them, though subjected to the cooling action of the pipe, moving along with nearly all the tar in suspense. The consequence is that, even after what is considered to be adequate condensation, considerable quantities of tar are found in the syphons on the works, as well as in the purifiers. Investigation into the present method of condensation led MM. Blanc and Caton to devise the arrangements shown in the accompanying illustrations, for which they have taken out a patent in France. The object is to effect the complete condensation of the tar as soon as it leaves the hydraulic main, and consequently while it is still hot; and the principle of the invention is the multiplication of the points of contact presented to the gaseous current.



The above illustration shows two types of the appliance; fig. 1 being a transverse section of the "plate" condenser, and fig. 2 a similar view of the "rod" condenser. Fig. 3 shows, on a small scale, the distributing arrangements. The apparatus is constructed of sheet or cast iron, and is divided into two compartments, A and B, by a partition reaching to within a few inches of the bottom. These compartments communicate, as shown in fig. 3, by nozzles and suitable valves. Compartment A constitutes the hydraulic main, into which the dip-pipe enters, while B is the condenser. In the type of apparatus shown in fig. 1, the latter compartment contains a series of vertical plates C, so arranged as to baffle the gas as it flows along. These plates are of two kinds, some having a single opening and others two openings—the superficial area of the latter being equal to that of the former—and they are placed alternately at suitable distances apart. The rate of flow of the gas remains constant at all points of the apparatus. The plates, which, as will be seen, dip into the liquid in the main, are fixed in grooves in the sides, and suspended in any suitable manner. After they have been placed in position, the vessel is hermetically sealed by a cover secured by a bolt. The action of the gas when it leaves compartment A and enters B is easy to understand. The flow of the gaseous fluid is baffled by the plates C, the solid portions in some of them corresponding to the openings in others—thus giving a large condensing surface in a small space, and compelling the tar held in suspension to deposit on the plates, and flow naturally into the liquid in the main, whence it is removed by any suitable means.

In the arrangement shown in fig. 2, for the plates are substituted a suitable number of tubes or hollow rods D, arranged in zigzag fashion. In this type of apparatus, condensation is effected in the same way as in the one previously described, though much more advantageously, seeing that a greater contact surface is presented to the gas. In both types, as will be seen, the dip-pipes are widened at the part just above the main; thus enabling the ascension-pipe F (not shown in fig. 2) to be isolated by the insertion of a spherical body E in the conical portion of the pipe.

Alderman William Thompson, who resigned the leadership of the local Conservative Party at Blackburn at the beginning of last year, has lately been presented with a costly canteen of silver, consisting of 278 pieces, weighing 350 oz.; Mrs. Thompson being the recipient of a gold and diamond pendant. Alderman Thompson was for a time Chairman of the Gas Committee of the Corporation.

SCOTTISH JUNIOR GAS ASSOCIATION.

Western District.

A Meeting of the Western District Section of the Association was held in the Technical College, Glasgow, on Saturday evening —Mr. J. M'Leod (Provan), the President, in the chair. There was a very fair attendance of members.

Mr. John Wilson (Glasgow) opened the business by reading a paper, from which the following are extracts, on

GAS-TURBINES.

In the Temple Gas-Works, there stands one of the earlier forms of gas-exhausters. It consists of three vertical cylinders fixed to a bed-plate; the two outside ones being exhausters, and the central one the steam-cylinder. The crank-shaft has one central crank and a disc at each end, and rests on a frame supported by columns about 7 feet high from the floor-level. The steam-cylinder is 12 inches diameter by 24 inches stroke; and the exhauster cylinders are 24 inches diameter by 24 inches stroke. Its capacity is about 1 million cubic feet per day, or (say) 41,000 cubic feet per hour. It was arranged to work with a boiler pressure of 40 lbs. per square inch; the engine running at 60 revolutions per minute when working at its maximum capacity. This type of exhauster gives fairly good results. The cost of maintenance is low, as the wear and tear is comparatively small. The chief objection is the pulsation set up by the action of the reciprocating piston, though this is minimized to a great extent by setting the two disc crank-pins at an angle of 45° to each other. Until quite recently this exhauster had been in constant use at the Temple works since the year 1872.

Having described the Beale and Waller exhausters—the former in use at the Dawsholm and Tradeston works, and the latter at Provan—the author went on to say: The turbo gas-exhauster is used at the Provan works for pumping the gas made there through a 36-inch main down to the Dalmarnock works. The distance between the two works is 5000 yards; and the level is 169 feet lower at Dalmarnock. The turbo gas-exhauster is a combination of a Parsons steam-turbine with a gas pumping-turbine.

The turbine engine consists of a revolving shaft fitted with rings of outwardly-projecting blades, running inside a cylinder fitted with rings of blades, but this time projecting inwards. The rings of blades of the case just clear the shaft; and between them those on the shaft spread out and almost touch the inside circumference of the cylinder. The steam enters, and first passes through one ring of fixed blades, and is projected from them in a rotational direction against the immediate set of moving blades attached to the shaft, imparting to them a rotational force. Its direction is again changed against the succeeding ring of fixed guide-blades; and the reaction caused increases the rotational force. This same process goes on as the steam reaches each successive set of guide and moving blades. The energy required to infuse into the steam its high rotational velocity is furnished by lowering the pressure; the steam expanding gradually in small increments.

At the end of the shaft there are pistons or dummies which are grooved to fit into similar grooves in the cylinder. As these dummies are to prevent end-thrust, there is a passage in the cylinder connecting each diameter of the shaft with the corresponding dummy of the same size. By means of a thrust-block in the end oil-keep, the clearance between the grooves can be adjusted longitudinally—thus forming practically a steam-tight joint. The exhauster end of the machine is directly coupled to the steam-turbine. The shaft carries propeller-blades which run between sets of stationary guide-blades. Both the propeller and the fixed blades are curved and set at a suitable angle to give the maximum efficiency. The inlet-passage is at the steam-turbine end of the exhauster, and the outlet at the other. These can either be placed on top of the turbine or underneath, as the circumstances may require. The shaft at the outlet end is swelled out to a larger diameter, in order to form a dummy piston, like those in the turbine engine, so as to counteract the end-thrust due to the moving blades.

The manner in which the gas is driven forward may be explained as follows: On entering the turbine, the gas meets the first set of moving blades, which impart to it considerable rotational velocity in the direction of the outward end. The first row of guide-blades redirects the gas in a longitudinal direction on to the second row of moving blades, where it receives a second increment of velocity and pressure; and so on, until, on reaching the outward end, it has attained the pressure necessary to force the gas through the pipes. The bearings are of the tubular cushioning type. A small pump, driven by worm gearing from the turbine-shaft, provides for the lubrication of all the bearings. In this way, the oil is circulated through the cooler end-bearings by means of service-pipes at a pressure of 8 lbs. per square inch. As the revolving shafts are of light weight, the wear in the bearings is so little that they frequently run for several years without having to be adjusted. The pressure in the gas-turbine is maintained by means of the velocity of the moving vanes; consequently there are no delivery valves to become damaged or to require renewal.

The large turbo gas-exhauster engines are governed by a sensitive centrifugal governor, which actuates the steam-admission valves, through the medium of a steam relay. At Provan, the engine is governed by a Tangye "Soho" centrifugal safety governor; so that, if the governor belt were to break, the governor would automatically cut off the steam and stop the engine. The steam is admitted periodically by means of a cam on the oil-pump shaft; the position of the centrifugal governor determining the duration of each gust. One of the outstanding features of the gas-turbine is its steadiness of pressure; since, as the action of the machine is purely a rotary one, the flow of gas is perfectly steady and continuous—thus overcoming the pulsations and more or less violent fluctuations in pressure due to the stroke of the piston in the reciprocating engine, and the intermittent action of the blades in exhausters of the Beale type. Then, again, there are no clearance losses in the turbine; therefore an absence of the slip so frequently met with in other types.

With the exception of the bearings, no parts of the steam or gas turbine come into rubbing contact, so that internal lubrication is unnecessary. The result is that the exhaust steam is kept clean and free from grease, and may, if desired, be condensed and sent back to the boiler without filtering. In the gas-end, there is practically no lubrication at all required, and no glands to demand constant repacking. The upkeep of the machine is, therefore, reduced to a minimum, and is quite different in this respect from the ordinary exhauster, where, owing to the large area of rubbing surface, a considerable quantity of lubricant is necessary.

When the turbo-blower had been finished, it was tested by being run on air before leaving Messrs. Parsons' works at Newcastle. In order to get an output of 13,000 cubic feet of air per minute, it was necessary to greatly increase the pressure difference between the inlet and outlet; and, as a consequence, the turbine required much more power than it would do when working on gas. It was, however, possible to determine the horse power developed from the pressure and volume of the air dealt with, and thus to obtain the steam combustion per horse power. The delivery pipe from the blower was connected up to a cylindrical chamber having a thin-lipped circular orifice of $11\frac{3}{8}$ inches in diameter (area 0·708 square foot). A pressure-gauge and thermometer were mounted on the chamber, and readings were taken continuously. The steam used was passed into a condenser, from which it flowed into tanks, where its weight was taken. The condenser was open to the atmosphere, and was used merely to condense the steam, and not to create a vacuum. The steam pressures were taken on the turbine side of the governor throttle-valve, and also at the boiler.

Three tests were made, with the result that the following data were obtained:—

Test No. 1.

Steam pressure, turbine side of stop-valve		= 126 lbs. per sq. in.
Air outlet	51·86 in. water-gauge	= 2373 ,, per sq. ft.
	Temperature	= 97·5° Fahr.
Air inlet	Barometer	= 29·69 in. = 2103 ,,
	Temperature	= 61 9° Fahr.
Speed		= 7850 revs. per min.
Steam consumption		= 4946 lbs. per hour.

Test No. 2.

Steam pressure, turbine side of stop-valve		= 100 lbs. per sq. in.
Air outlet	40·1 in. water-gauge	= 2311·5 lbs. per sq. ft.
	Temperature	= 91° Fahr.
Air inlet	Barometer	= 29·69 in. = 2103 ,,
	Temperatue	= 62° Fahr.
Speed		= 6700 revs. per min.
Steam consumption.		= 3950 lbs. per hour.

Test No. 3.

Steam pressure, turbine side of engine stop-valve		= 75 lbs. per sq. in.
Air outlet	29·4 in. water gauge	= 2256 lbs. per sq. ft.
	Temperature	= 84° Fahr.
Air inlet	Barometer	= 29·69 in. = 2103 ,,
	Temperature	= 61° Fahr.
Speed		= 5770 revs. per min.
Steam consumption.		= 3000 lbs per hour.

Calculating from the data obtained in the tests, we get the following

Summary of Results.

	Test No. 1.	Test No. 2.	Test No. 3.
Volume of air delivered at 60° Fahr. and 30 in. bar., in cubic feet per minute	13,409	11,600	9750
Pressure difference (water)	51·86 in.	40·1 in.	29·4 in.
Effective horse power of turbo-blower	105·5	74·0	46·0
Steam consumption per horse power	47·0 lbs.	53·4 lbs.	65·0 lbs.
Revolutions per minute	7850	6700	5770

As will be seen, these trials on air were quite satisfactory, and showed that the turbine was fully up to its work. After it had been installed at Provan, and in use for a short time, it was again tested; on this occasion with gas. The steam consumption was not taken in this instance; but as the turbo-blower drew the gas from one $8\frac{1}{2}$ million feet holder, with all the other valves closed, it was possible to make direct measurements of the volume of gas dealt with, instead of having to resort to calculations, as in the air trials. The pressure thrown by the holder was $8\frac{1}{2}$ inches water-gauge; and the average temperature was 49·3° Fahr. The barometric pressure was 29·7 inches; and the specific gravity of the

gas at 60° Fahr. and 30 inches barometer was ·447. The following table shows the results of the tests with gas:

	Test No. 1.	Test No. 2.	Test No. 3.	Test No. 4.
Volume of gas delivered at holder temperature and pressure, cubic feet per minute . .	7916 ..	11,666 ..	15,166 ..	18,179
Pressure difference, inches of water-gauge	2·1 ..	7·4 ..	13·3 ..	18·0
Revolutions per minute	3500 ..	5292 ..	7266 ..	8568

The capacity of the blower at full load (Test No. 4) is 1,090,733 cubic feet of gas per hour. This is far too large a unit for adoption in place of ordinary exhausters. In this connection, it is worth noting that the turbo-blower can deliver more gas than the whole of the eight exhausters at Provan working together can draw from the hydraulic main. The steam consumption, it will be noticed, is heavy; the best result obtained being 47 lbs. per H.P. This is considerably more than would be used in a reciprocating engine, had such been adopted in conjunction with a fan or Roots blower. In either of these combinations, however, a much larger proportion of the power would have been wasted on belt-and-shaft friction; and it is doubtful if the steam used per 1000 cubic feet of gas blown would have been less. The steam consumption could have been greatly decreased by using a condenser; but as the turbo-blower is only employed intermittently, the additional capital cost would not have been justified.

The turbo-blower is admirably suited for the purpose for which it has been installed at Provan. It is small and compact for its output. It is easily started, and requires practically no preliminary heating up; and when once started it will run for hours without attention, with a perfectly steady gauge. It has little or no vibration, and requires no foundations worth speaking of. It is not even bolted down to the 3-inch reinforced concrete floor on which it rests.

The writer is indebted to Mr. James Lowe, the Assistant Manager of the Department, for the particulars of the tests given.

Mr. Wilson concluded by showing, by means of the lantern, a series of views illustrating the construction of turbines.

Mr. J. M. Popplewell (Glasgow) read a paper on

COAL TAR DISTILLATION.

After some preliminary remarks, the author said:

My object this evening is to give you a brief outline of the general principles involved in the distillation of coal tar. I do not propose to inflict upon you any technical details in connection therewith, but shall merely take, as it were, a "bird's eye view" of the whole industry as carried on at the present day. I propose to divide the subject into two portions—viz., (*a*) actual distillation of coal tar, and (*b*) subsequent treatment of crude products obtained in operation.

The distillation of coal tar is carried on in cylindrical wrought-iron stills. In some instances the bottom is convex, and in others concave; there being some difference of opinion as to which is the better adapted for the purpose. The capacity of the stills varies considerably in different works, and is usually anything from 10 to 30 tons. The still is fitted with a charging-cock, through which the tar is charged into the still; a run-off cock, whereby the pitch leaves the still at the end of the distillation; a swan-neck through which the products of distillation pass as vapour; and also a specially-arranged steam-pipe is provided on the bottom of the still inside, perforated with small holes for the admission of live steam. A safety-valve is provided on the dome. The still is connected to an ordinary worm-condenser cooled with water; and the end of the worm is coupled up to a receiver, into which the various oils flow. This receiver is in turn connected to a number of store-boilers, into which various products obtained at different stages of the distillation ultimately find their way. At the back of the still is a boiler, for running in the hot pitch as it leaves the still—this being known as the pitch cooler.

In carrying out a distillation, we will suppose the still is charged to within 2 or 3 feet of the top. A still must not be charged fuller than this, owing to the great tendency which crude coal tar has to froth in the early stages of distillation. This is caused by water which the crude article always contains; and the more water there is present, the more difficult will be the tar to deal with. A moderate fire is kindled under the still, which is maintained until distillation commences. The firing must now be done very cautiously—this being the most critical part of the whole process. If great care is not exercised, the chances are that the contents of the still will boil over. This means, of course, a certain loss of material; and also what is of infinitely greater concern to the tar distiller is the great risk of an outbreak of fire which is entailed by an occurrence of this description. The slow firing must be continued until the whole of the water has been expelled from the tar, which usually occupies considerably more than half the time required for the whole distillation. At the end of this stage, the firing may be increased, and the distillation will proceed much more rapidly.

Towards the conclusion of the process, when the run of the distillate begins to slacken somewhat, the distillation is considerably assisted by the introduction of open steam into the still by means of the steam-pipe. At the end of the process, the residue remaining in the still is pitch; and it is necessary to mix with it a certain quantity of heavy oil, in order to bring it to the proper consistency as required by commercial tests. After being allowed to cool in the still for a few hours, the pitch is run into the cooler, where it is left to cool to a still lower temperature, out of contact with the air. This precaution is necessary owing to the hot pitch being very prone to take fire spontaneously when coming into contact with the air. When it is considered that the temperature has been sufficiently reduced, the pitch is finally allowed to run into large shallow "bays" built of brickwork, where it sets into the hard, black, glistening mass, the appearance of which is well known to you all.

The distillates which are taken off during the process are usually as follows: Ammoniacal liquor; crude naphtha; light oil; creosote oil; anthracene oil. The changing points for the different fractions are sometimes ascertained by temperature, sometimes by the specific gravity of the distillate, and sometimes by the quantity of the distillate as previously ascertained by laboratory test. The changing points vary with different tars; and thus it is necessary to make an analysis of a tar in order to ascertain at which point it would be advisable to change in order to get the best yield of each product. Even a tar obtained from the same source will vary greatly from time to time.

Ammoniacal Liquor, of course, is utilized for the manufacture of sulphate of ammonia. As this process does not come within the domain of my paper, I do not propose to spend any time in a description thereof.

Crude Naphtha is regarded by the tar distiller as the most valuable of his crude products, because it consists chiefly of the light hydrocarbons—such as benzene, toluene, xylene, &c.—and also contains small quantities of pyridine bases and carbolic acid. In the rectification of crude naphtha, the procedure is usually on these lines: The naphtha is charged into a large lead-lined vessel fitted with agitating gear, generally consisting of a vertical shaft with a propeller. In this vessel it is subjected to a series of washings as follows: (*a*) With caustic soda, to remove phenolic bodies (carbolic acid); (*b*) with vitriol, to remove sulphur compounds and empyrematic resins and bases; (*c*) with caustic soda, to remove all traces of mineral acid. After the above treatment, the naphtha is ready for distillation, and is accordingly charged into a large wrought-iron still fitted with a fractionating column. The distillation is carried on by a system of steam-coils inside the still. The fractionating column is 20 to 30 feet in height, and is divided into a number of chambers by means of horizontal partitions. The overflow pipes, by means of which the condensings travel down from chamber to chamber, are so arranged that a depth of about 2 inches of condensings is always maintained on each plate; and each of the vapour uptake pipes is covered with a serrated cap dipping below the surface of the condensings, so that the vapour receives a thorough washing in its upward passage. The distillate is collected in the usual way, after passing through a worm-condenser cooled by water. The products obtained from this operation are known commercially as 90 per cent. benzol and 90 per cent. toluol.

Light Oil consists essentially of a mixture of the heavy naphthas with creosote oil. It also yields varying quantities of carbolic acid and pyridine bases. The procedure adopted in the treatment of this oil is: The oil is first charged into a cylindrical wrought-iron agitator, where it is thoroughly mixed with a solution of caustic soda, in order to remove the phenolic bodies. It is next charged into a still, where all the naphtha is distilled off; the residue remaining in the still being creosote. The naphtha obtained from this oil next undergoes a series of washings with vitriol and caustic soda, exactly similar to the treatment already described for crude benzol, after which it is again distilled. The products of the final distillation are solvent naphtha and heavy solvent naphtha. These naphthas, as the name implies, are principally used as solvents; the india-rubber trade taking a great quantity of the production.

Creosote.—This oil is the one which forms by far the greater part of the distillate obtained at the tar-stills, and is accordingly correspondingly low in market value. It is usually sold in the crude state, just as it is obtained by the first distillation of the tar. It is of a greenish yellow colour when fresh, but becomes darker on keeping. Its specific gravity ranges from 1·035 to 1·050. On cooling below 60° Fahr., the oil usually deposits salts of naphthalene; and for this reason it is usual to provide a steam-coil in the tank used for its storage. Creosote oil meets with many industrial applications, among which may be quoted: Softening hard pitch; pickling timber; preparation of varnishes; lubricating oil; manufacture of lamp-blacks; lighting (Wells lights, &c.); as an antiseptic; and blue steaming of bricks. Its chief use, however, is for the preservation of timber; and it has been pronounced by eminent authorities to be unrivalled for this purpose.

Anthracene Oil (*Green Oil, Red Oil*).—This is the last fraction to be taken off at the tar-still, and consequently consists entirely of high boiling hydrocarbons. The hot oil from the still is run into large shallow iron pans, where, on cooling down, crude anthracene salts out in the form of a paste. The slimy mass thus obtained is pumped through a filter press, which separates the crude anthracene from the oil. After removal from the press, it is further freed from oil by whizzing in a centrifugal machine. The product thus obtained will test 28 to 33 per cent. real anthracene. In some works, hot pressing is resorted to with equal success. The drained oil obtained in the above-named process is either added to the creosote or used for softening the pitch. Sometimes it is sold as a lubricant. The chief use of anthracene

is in the manufacture of artificial alizarin; the latter providing the colouring matter for turkey-red dyeing. Owing to the present low price of anthracene, many distillers do not consider it worth while taking off this fraction, but prefer to finish the distillation when the creosote is off. By doing this, the pitch that is left in the still is of about the proper consistency, and does not require the addition of oil for softening purposes.

Having now dealt with each of the crude oils as obtained at the tar-still, it might be interesting to touch upon one or two of the subsidiary processes which are often carried on in a tar distillery—such, for example, as the refining of naphthalene. Most tar distillers are equipped with the necessary plant for the extraction and refining of this article; but whether they will carry on the process or not, usually depends upon the state of the market. If, however, the price be sufficiently good to warrant its extraction, the methods usually adopted are as follows.

That fraction of the oil from the tar-still which contains the greater part of the naphthalene (generally the light oils, and probably the earlier portion of the creosote fraction) is run while warm into large shallow iron pans, where it is allowed to stand for two or three days. At the end of this period, a great quantity of naphthalene will have crystallized out from the oil. The latter is then separated from the salts, which are allowed to drain thoroughly. Even after draining for some time, however, the naphthalene still retains an appreciable quantity of oil. The salt is therefore next whizzed in a centrifugal machine, in order to free it as far as possible from all extraneous oily matter. The naphthalene thus obtained is, of course, only a crude article, and must be submitted to rectification.

The crude salt is now melted up, charged into a still, and distilled. The first 10 per cent. of the distillate, or first runnings, is ignored; the next 80 per cent. being collected as containing the best part of the naphthalene. This is again allowed to crystallize, and is then subjected to about 200 atmospheres pressure in a hydraulic press. The pressed salt has then to be washed. This is carried out in closed iron vessels lined with lead, in which the naphthalene can be heated above its fusing point by means of a coil or steam-jacket. The vessel is provided with the necessary mechanical agitating gear. The fused naphthalene is then subjected to the following washes: (*a*) Caustic soda; (*b*) hot water; (*c*) rectified oil of vitriol; (*d*) two or three times with water; (*e*) with caustic soda to remove free acid. The washed naphthalene is afterwards again distilled, when a small quantity of aqueous first runnings will come over, after which about 50 per cent. of pure naphthalene may be collected. This is run direct into barrels, and is ready for sale.

Naphthalene comes into the market in the form of white crystalline masses or (after sublimation) as thin rhomboidal scales. It fuses at 79° C., and boils at 218° C. The property which is of most concern to the gas maker, however, is its extreme volatility, as, unlike most bodies, it volatilizes far below its boiling-point. This will doubtless recall to the minds of many of those present unpleasant recollections of blocked mains, which this remarkable property has on so many occasions been responsible for.

Another process which is carried on in most tar distilleries is the extraction of carbolic acid. Carbolic acid or phenol is extracted by agitating the light-oil fraction with a solution of caustic soda. Carbolic acid is entirely soluble in the latter, forming what is known as carbolate or phenolate of soda; and when the agitation is finished, this settles to the bottom of the mixer, and may be run off quite free from oil. This carbonate of soda is run into a large iron vessel lined with lead, where it is subsequently neutralized with sulphuric acid. This causes the carbolic acid to separate and rise to the surface of the sulphate of soda solution, when it may be skimmed or syphoned off as required. The article obtained in this manner is known commercially as crude carbolic acid, and considerable rectification is necessary in order to obtain the pure article. Time, however, will not permit me to go into the various details in connection therewith.

Carbolic acid is extensively used as an antiseptic and disinfectant; its power of destroying the lower organisms being now fully recognized by the most eminent authorities. For this reason, carbolic acid, or preparations thereof, have been almost universally adopted by the medical profession for the antiseptic treatment of wounds. Carbolic acid is also largely used for the manufacture of picric acid and the picrates; these latter compounds being now required for the manufacture of lyddite and melenite explosives.

Discussion.

Mr. A. Wilson (Glasgow) said he would not try to discuss Mr. Wilson's paper; but he might state his reasons for adopting the class of exhauster referred to for the work he had to do. When he had to arrange for pumping the gas from Provan down to Dalmarnock, he looked round to see what would be the best way of doing the work, and he took an opportunity of investigating various plants that were doing similar work. He could not say he was at all favourably impressed with the suitability of any of them for his purpose. He found steam-driven exhausters pumping gas on to a district, and from holders into other holders; but, as most of the members knew, the pulsation due to these exhausters was usually very detrimental to the parties who had to use the gas. He also found exhausters driven by gas-engines. But they had the fatal objection, to his mind, of causing pulsations. He then examined several plants where blowers were in use, driven in some cases by steam-engines, and in others by gas-engines. He found that these blowers were doing good work up to a certain pressure. When, however, the pressure got up to a certain point, they did not seem to be nearly so effective. Where they were used solely for sending gas out into a district, to work against pressures of (say) 12 inches, they seemed to do fairly well. He, however, had to provide for something very much higher. As they would see by the tables submitted, they had, in sending gas down to Dalmarnock, a variation in pressure of perhaps 16 to 18 inches. But he thought it well, when putting down the plant, to arrange for a difference of at least 24 inches, in view of extra quantities of gas being required to be sent forward, due to increased consumption. When he approached the makers of various blowing plants, and asked them to give him a plant of sufficient capacity to work against a pressure up to (say) 24 inches, he was met by the statement that they had no blowers that could perform this duty. He could take one set of blowers, and put them down, then put down another set and work in series with them, and so increase the pressure; but it seemed to him that this was going to be a very complicated arrangement to adopt. The house, as they would have seen from the lantern slide, was built of fairly large size—in fact, it was arranged, in the first instance, for two sets of blowing plants, with counter-shafting, driven, he thought, by gas-engines. When he had considered the matter, and looked all round to see what he could get, it occurred to him that he might try Parsons' people, and see what they could do for him. The chief objection they raised was that what he wanted was a very small plant for them to manufacture. However, they considered the matter, and the result was the plant the members had seen on the screen. It was to deal with 750,000 cubic feet of gas per hour, against a pressure difference of 24 inches. As they saw by the tests, the exhauster amply fulfilled the guarantee; and a second plant had been put down as a stand-by, though up to the present it had not been required in that capacity, as they had never had any difficulty with the plant. The results obtained from the second plant were actually better than those they had with the first. The cost of the upkeep of the exhauster had been very low indeed. It had worked to his utmost satisfaction. He was very glad he went in for this particular style of exhauster, for it seemed to him to be eminently suited for the special class of work. Supposing they had to send gas into any district, or into all of them, the consumers would never experience any difference in the supply from what it would be if the gas came from the holder—the pressure was so steady. There was not the slightest pulsation, as they could readily understand from the construction of the exhauster and the velocity at which the shaft was driven. He was, therefore, very pleased to say that the exhausters had, up to the present time, cost them nothing for repairs; and the outlay for lubrication, attention, and other matters, was very low. It was quite different, in this respect, from other exhausters, where the quantity of oil required for the lubrication was somewhat high. With regard to the other paper, it seemed to him that the author quite understood his business, and had dealt with his subject very fully. He (Mr. Wilson) would like to ask him whether he found more naphthalene in the tar obtained in Scotland than in that got in England from the distillation of coal. There was very little trouble with naphthalene in Scotland. They found it to a slight extent in the scrubbers, but not in anything like the quantity to be met with in the South of England.

Mr. J. Webster (Provan) bore testimony to the excellent working of the gas-turbines. As for repairs, they were practically *nil*. No. 1 machine had run for two years, more or less, and the repairs on it had not amounted to 5s. The cost for oil was very little. The second machine had been running for two months; and when he asked that day how much oil had been used for it, he was told that none had been required. It was very easy to work. When gas had to be sent out, the man just turned on the turbine, and then he could go away. There was absolute safety in the working of it. Sometimes they were short of gas at Provan, and if they had plenty at Dawsholm they took advantage of it. At one side of the governor they might have 42-10ths, and at the other side 40-10ths; and the machine would run for hours with a difference of only 2-10ths, and without any variation. They could not do this with any other type of exhauster. They could draw out from the bottom lift of the holder with absolute safety. Of course, when they did this they ran at a slow speed; and then, perhaps in the afternoon, they would run down 900,000 cubic feet of gas per hour, going at full speed. Since the machines were put in, he had not seen any part of the inside of them. He had never had a single part out to see what it was like, never having had occasion to do it.

Mr. J. Lowe (Glasgow) said he could corroborate everything that had been stated about the turbines. The members would notice that the quantity of gas did not increase with the number of revolutions. This was to be expected. The same thing happened in the machine which occurred with the larger fans. When the pressure got up, the slip increased—the gas tended to run back to the other side of the fan. But where they had three fans or more in series, as in the case of the largest air-blowers, this was reduced in several ways. They had a smaller area, and there was less room for the slip to take place. Then there was the slip at the edges, from one side of the propeller to the other. Undoubtedly as the speed and the pressure increased, the slip increased. The same thing occurred in all steam-turbines. It

had been repeatedly stated, in favour of the steam-turbines, that initial condensation, leakage past valves, and all this sort of thing, and alternate heating and cooling of the cylinders, which occurred in the reciprocating engine, had been entirely done away with, and that therefore these machines should be much more efficient. Of course, in a large concern, the steam-turbine was a more efficient machine, although the record was at present held by the reciprocating engine at a certain pressure. But he wished to point out that there was a loss in the steam-turbine, due to considerable slip. The steam rushed through both the fixed and the stationary blades, and round the circumference, without doing any work; and also, if he might so express it, by the agitating of the steam it did not flow in a steady stream, but was caught and deflected between the fixed and moveable blades. These two causes accounted for the steam-turbine not having greater efficiency. In small sizes, the machine was not very efficient. It would take perhaps from 20 lbs. to 25 lbs. of steam to arrive at a certain speed with an ordinary engine; but a turbine took 47 lbs. On this account there was greater steam consumption. But it was really the commercial and not the theoretical cost which appealed to engineers.

Mr. D. Vass (Airdrie), speaking as a gas engineer, said he was disappointed to hear that the splendid machines mentioned would not be of much use in small works. He wished information on the point as to whether the turbine exhauster was not a separate part of the machine from that of the steam-turbine, and would therefore be applicable to any gas-works. They might only require to get a revolving shaft from some other easily adapted arrangement. If this was the case, what was to prevent them adopting some system of obtaining the motion, and affixing it to the exhauster? The turbine gave such a steady flow of gas that it would be of great service to them.

Mr. P. M'Dougall (Helensburgh) asked if some type of self-acting apparatus was fixed in connection with the turbine, so that, should a breakdown occur, it might come into use as a by-pass. The value of the paper might have been increased if something had been said about the De Laval turbine with the Sturtevant blower, which had been applied in some places.

Mr. Q. Moore (Glasgow) asked how the cost of the turbine compared with that of the older exhausters.

The President said he had personally enjoyed the clear and extremely lucid way in which their, as yet, youngest lecturer had given his paper. It was extremely creditable to so young a member that he had tackled so difficult a subject, and had put it before them with such absolute lucidity, and with such a clear grasp of the principles involved. It was a great step from the days of Hero of Alexandria, who, about 120 B.C., really invented the turbine, to the present day, when they had the Parsons, De Laval, and other turbines; and that they in Glasgow should have the first turbine applied to gas-works was a very pleasant thing to contemplate.

Mr. Wilson, in reply, referring to the question put by Mr. Vass, said that in their case the engine was detached from the exhauster by a couple of bearings. The same thought passed through his mind, whether it would not be practicable to have the turbine driven by means of belts or otherwise; but then he thought that it might be a patent, and that they might not be allowed to use it as they pleased. The difficulty with other forms of power would be to get the high speed necessary. As the exhauster was only used intermittently, there were, of course, means for bye-passing the gas. In the case of the exhauster breaking down, the gas would not pass, and no harm would be done beyond the gas not being received at the other end. But as it would not be drawing away any gas, it would be the same as if the turbine were off. He had heard of the De Laval turbine, but not as working in conjunction with a Sturtevant blower; and he was sorry he could not say anything on this point. He did not know the exact cost of the turbine, but he mentioned that it was able to do more work than the eight other exhausters at Provan; and he might say that it only cost about one-third as much as all the other exhausters did. So they were getting more work done at one-third of the cost.

Mr. J. Lowe, speaking on the subject of Mr. Popplewell's paper, said the author had begun at the beginning of his subject, and had gone right through it. The tar-still shown was of the form, with the inverted bottom, most generally in use; but they had departed from this kind of still altogether in Glasgow. There was difficulty in getting the outlet-pipe into the centre. It made a better still, in his estimation, to have this pipe in the centre, because it was not liable to get filled up with hard pitch at the bottom, which required to be broken up with a pick, or in some other way, after the heavier fractions of the oil had been taken off. In Glasgow, some years ago, they made a still very much longer, with the bottom egg-ended, and with an outlet-bend for the passage of water, and the outlet-valve in the centre of the bench, not far from the fire. The valve was actuated by means of worm gearing. It was very useful to remember that the final temperature inside a tar-still was about 500° Fahr., which was very much higher than occurred (say) in a steam-boiler. There was no steam-boiler, with saturated steam, which had a temperature so high as 300° Fahr.; so that the pitch, when run off, was very hot. He had the design of the benzol-still which was used at Provan; but previous to that he had one of another still, which was erected at Dawsholm. They found by experience that there were several alterations which could be made upon the Dawsholm still, one of which was in the steam heating-coils. These used to extend to the top of the still; but it was found that, after the crude naphtha had been taken off, the coils above the surface of the liquid superheated the vapours coming off, and rendered the rectifying coils less effective than they should have been. One great difficulty in this class of plant was getting tight joints. Benzol vapour would go through almost anything; and the coil had to be, as far as possible, without an internal joint. He was looking up this subject some years ago, and was very much astonished to find that, long before the days of Murdoch, a patent was taken out for the distillation of coal, not for the purpose of making gas at all, but for making "cole tarre." The gas was the bye-product in those early days. The first plant for the carbonization of coal was erected at Culross, in Perthshire, by, he thought, Lord Dundonald.

Mr. D. Vass said in his early days he had some experience of tar distillation. In the works at Greenock Mr. Stewart introduced tar distillation many years ago. It was, however, only carried out so far as the crude naphtha. The experiments which had been shown to the members illustrated the advantage of belonging to an Association like theirs. In his young days, he had to ask the privilege of admission into works, here and there. He was always well received; but he could assure the members that they had a great privilege, compared with what he then experienced, in having such subjects brought before them as those they had been considering, and being able, in the course of a year, to ascertain what took him two or three years to get over.

Mr. Q. Moore pointed out that there were two critical points in the process of tar distillation—one at the beginning, when the distillate was coming through; and the other, and perhaps the more dangerous one, later on, when the free water was being taken off. There was very great danger of an eruptive explosion at that time. He thought the egg-ended still was the most convenient one to work. There was a prospect of the patent laws of this country being altered, even this year; and if this were done, possibly the coal-tar colour industry might come back to this country.

Mr. C. Ratcliffe (Glasgow) remarked that the costs of working came out about the same, whether the still were a 10-ton or a 30-ton one, though he considered that by making a big charge and working off a quantity there should be a saving.

The President said Mr. Popplewell was to be congratulated on showing them the form of the fractionating column. The progress of the distillation of coal tar had been very great indeed; and he was glad to hear that the colour industry might come back to this country. It was one of the standing disgraces that it had left us so entirely as it had done. He was glad to see that the Gaslight and Coke Company were making a good many dyes; and also that a firm in Manchester were doing the same. It was rather a curious fact, as pointed out by Mr. Lowe, that the coal-tar trade was started in Scotland; and he hoped that in the future Messrs. Brotherton, whose representatives were with them that night, or some other firm, would start the making of coal tar colours in Scotland, where there were a great many firms engaged in dyeing. It would be of great advantage to them.

Mr. Popplewell, in reply, said it had been a great source of pleasure to him to listen to the remarks which had been made on his paper. They did not find any great difference in the quantity of naphthalene contained in Glasgow tar and that contained in Lancashire and Yorkshire tar; but he believed the tars produced in London and the districts in the South contained a very high percentage of naphthalene. One disadvantage of the egg-ended tar-still was having the run-off cock in the centre. This still was bound to be supported by brickwork in the centre, and the run-off cock would require to be protected. This detracted from the heating surface. They did not find any difficulty, in their English stills, in regard to pitch having to be dug out with picks, or anything of the kind. The pitch ran off quite clear from the bottom of the still.

A vote of thanks to the readers of the papers having been accorded, the meeting terminated.

Mr. F. H. Armstrong, Solicitor, has been appointed Secretary and Treasurer of the Hawick Gas Company, in succession to the late Mr. J. R. Carmichael.

Ex-Bailie James Craig, of Kilmarnock, the Managing-Director of Messrs. J. & M. Craig, Limited, manufacturers of fire-clay goods, died on the 6th inst., at the age of 85. The business was commenced by his father, Mr. Matthew Craig, in 1828.

At the meeting of the Institution of Civil Engineers last Tuesday, it was announced that Mr. George Garson, B.Sc., who is associated with the water supply of Melbourne, had been transferred from the class of associates to that of members.

In the "Journal" for the 7th of August last, we announced the appointment of Mr. W. H. Adams, of Gosport, as Engineer and Manager of the Bilston Gas Company, in succession to the late Mr. J. S. Reeves. The deceased gentleman also held the position of Secretary; and this was last Friday conferred upon Mr. Adams.

It is announced that Mr. D. F. Schloss, who has been engaged in the Labour Department of the Board of Trade, has been appointed Director of the census of production, to be compiled under the Act of last session, the object of which, as mentioned elsewhere, is to obtain a measure of the total productions of the factories and workshops in the United Kingdom.

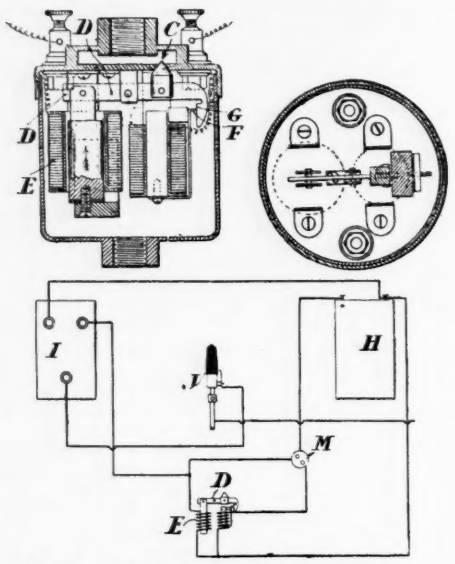
REGISTER OF PATENTS.

Electrically Operated Gas-Burner Tap.

HACKING, A. E., of Nottingham.

No. 248; Jan. 4, 1906.

This electrically operated gas-valve and its operating mechanism is enclosed within a gas-tight chamber between the gas supply and the burner, and in which the valve is opened by an electro-magnet—retained in the open position by a spring catch and closed by the release of the catch by a second electro-magnet. An electrical solenoid and its core are used to open and close the valve by and through power lever arrangements, which operate to "effectively prevent any possibility of the valve sticking or not closing properly." The core of the solenoid hangs from the one end of a first-order lever, at the other end of which a valve head is pivotally connected. A known form of automatically operating catch is combined with the aforesaid features to hold the valve open.



Hacking's Electrically Operated Gas-Burner Tap.

The gas-tight box shown has an inlet at the bottom and an outlet at the top; the same being placed between the gas supply and the burner. Between the inlet and outlet is an automatically acting gas-valve C, comprising a seating and valve head carried by a first-order lever D, and the seating provided in an intermediate wall of the chamber. The lever rocks on a stationary fulcrum, and has hanging from its one arm the core of a solenoid E. On its other arm the lever carries, pivotedly, the valve-head, and is provided with a catch detent. The solenoid core is extra weighted to normally close the valve and cut off communication between the inlet and outlet. The solenoid, when the proper switch is momentarily closed, sucks the core upwards in the direction of the arrow, and thereby rocks the lever to take the valve-head from its seating and establish communication between the inlet and outlet. The catch detent is, by the rocking of the lever, brought opposite an automatically operating catch F, which instantly engages the detent and holds the lever with the valve open until another switch is momentarily closed to pull the catch out of the detent. The catch F is on the end of a limb spring, supported by an electro-magnet; the limb spring carrying an armature adapted to be attracted by the electro-magnet. The electro-magnet acts only to pull the catch from the detent—the catch, by the power in the limb spring, automatically engaging the detent. When the valve C is closed (as represented), the catch bears against an edge G of the adjacent arm of the lever, which serves as an abutment in guiding the catch to the detent.

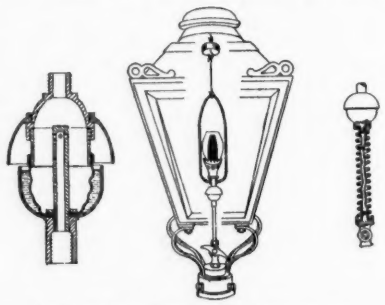
The solenoid, the electro-magnet, the valve, and the automatically acting catch are all within the gas-chamber, between the inlet and outlet, and the bobbins of the solenoid and magnet are both connected up in electrical circuits controlled substantially as represented in the diagram. Here H is the battery, I is the sparking coil, J the gas-burner with its sparking devices, and M a two-button switch, E being the solenoid and D the lever. If the upper button on M is pressed, the solenoid E and the sparking coil I are put into circuit. If the lower button is pressed, the electro-magnet is operated without the coil being put in circuit—it being understood that only one button on M is operated at a time.

Anti-Vibration Suspenders for Incandescent Gas-Burners.

CURTIS, G., of Hunslet, Leeds.

No. 2653; Feb. 3, 1906.

According to this invention, a tube is formed of Persian cloth, chamois leather, or other material having a similar high degree of flexibility, which may be rendered impervious to gas without spoiling its flexibility, and is not injuriously affected by the gas passed through it. The lower end of the tube is fitted (as shown) in a cup or cylinder fully open at the top, having a smaller opening in the bottom connected to the gas-pipe, and into which opening the end of the tube is fitted gas tight. The gas-pipe projects some distance up the flexible tube; being closed at the top, but having side openings at the top so as to be drip-proof. The bottom cup is filled, or nearly so, with glycerine, or



Curtis's Anti-Vibrator for Gas-Burners.

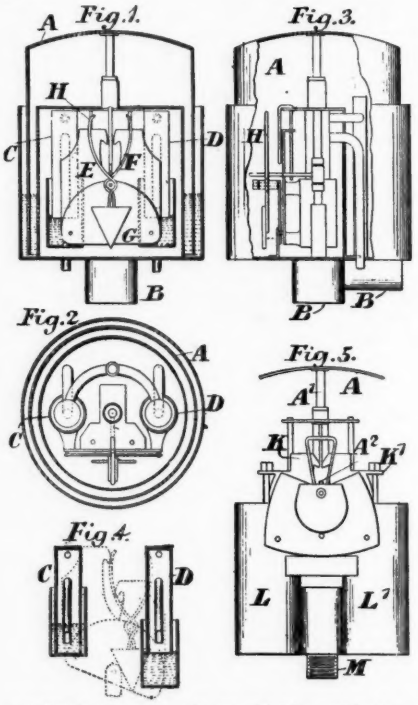
a mixture of glycerine and water, to protect the greater part of the tube from the action of the weather. To the lower part of the burner, to which the upper end of the flexible tube is connected, there is attached a cup or cylinder with the open end downward, and suitably larger in diameter than the bottom cup, so as to fully protect the latter from the wind and dust, while allowing all the vertical and lateral play or swing which may be imparted by vibration to the one or other, or both, without bringing the two cups into contact.

Automatically Lighting and Extinguishing Lamps.

ROSIE, J., and M'KELVIE, J., of Edinburgh.

No. 3148; Feb. 9, 1906.

This invention relates to the automatic lighting and extinguishing of gas-lights by varying the pressure in the mains, so that, simultaneously with the extinguishing of the gas-burner the pilot burner is lighted, and simultaneously with the extinguishing of the pilot burner the gas-burner is ignited.



Rosie and M'Kelvie's Automatic Gas Lighter and Extinguisher.

Fig. 1 is a sectional elevation of the apparatus. Fig. 2 is a sectional plan. Fig. 3 is a sectional elevation at right angles to fig. 1. Fig. 4 is a detail. Fig. 5 is an elevation of another form of the lighter and extinguisher.

The apparatus consists of a small gasholder A, the dome of which is weighted to remain down with abnormal pressures in the main; while by increasing the pressure in the main, the gas is lighted or extinguished. It is provided with an annular space into which the depending portion of the holder is inserted—the space being provided with a mercurial seal. Gas is conducted through the pipe B upwards into A and also into the gas-sealing chambers C and D, as shown more particularly in fig. 4—a section of the sealing-chambers. When the gas enters A, through the pipes B, it is also conducted into branch pipes communicating with the sealing-chambers C and D; and the arrangement is such that the pressure of gas entering A from the mains causes the bell to ascend. In so doing, one or other of the small supply pipes is unsealed, and gas is allowed to flow out of one of the sealing-chambers C D—thence, through the pipes, to either the pilot light or the gas-light proper. The small pipes referred to depend within the sealing-chambers C D, shown more particularly in figs. 1 and 4. It will be observed that in fig. 4 the opening of the left-hand pipe is sealed; therefore there is no gas supply through it. Gas, however, is being supplied through the other pipe by reason of the end of it being unsealed.

When the sealing cups are in the half-position, gas for the moment enters both the pilot-pipe and the gas-light pipe, so as to allow one light to ignite the other before cutting off the supply to either of the two pipes.

To actuate alternately the sealing and unsealing of the pipes, there is connected to the dome of A a rod, which is elevated and lowered by the action of the dome of the holder. This rod has attached to it a radial arm, which is caused to rise and fall; and, in doing so, it engages with one or other of the arms E F, at their hook-shaped ends. These arms are connected to sealing cups E and F^1, so that they are capable of raising and lowering the cups, which are provided with a mercurial seal Attached to the bottom of the arms E and F is the half-disc G, pivoted to a bracket secured to the bottom of the gasholder, and shown more particularly in dotted lines in fig. 4.

Secured to the top of the half-disc G is a pin projecting out from its face; and loosely pivoted to the pin is the wire tumbler H, which is provided with a counterbalance, the arrangement of which and the tumbler H is such that the counterbalance always keeps the tumbler in a perpendicular position irrespective of the position of the half-disc G by which it is carried.

Fig. 4 shows the relative position of this tumbler and counterbalance with the half-disc G. Depending from the fixed bracket shown in fig. 1 (and more particularly in fig. 3) is a guide-rod, to keep the radial rod in position while it is elevating one of the arms E or F. The tumbler H performs the function of altering the position of this radial rod, so that it engages with the hook-shaped portion of one or other of the arms E F—that is to say, the bottom of the tumbler where the rod is resting in (as shown in fig. 1) is transferred to immediately below the hook-shaped portion of one of the arms E F, or, in other words, the rod, as it descends, follows the contour of the inside of the tumbler H. This alteration in the position of the tumbler being effected, as already described, by altering the position of the half-disc G by which it is carried.

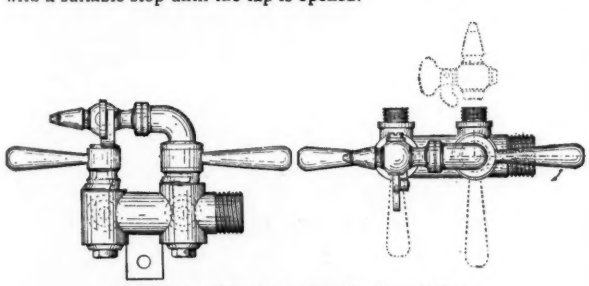
Fig. 5 is a modification showing another way of actuating the sealing cups within the sealing chambers—that is to say, the patentees dispense with the arrangement of arms E and F, figs. 1 to 4, and actuate the sealing cups from the centre of the sealing-chambers L L^1. The method of actuating the sealing-cups is effected as in figs. 1 to 4; but the arrangement is different. Here A is the dome of the gasholder, to which the rod A^1 is connected—being provided with a guide (not shown) in the lower portion of the sealing-chambers L L^1. This rod carries a radial rod which actuates either one or other of the arms K K^1 connected to the rods of the sealing cups. The action is therefore such that an upward and downward motion to either one or the other of the arms K K^1 is imparted by the radial rod by engaging with one or other of the hooked ends of the arms K K^1. The governing of the radial rod (that is to say, the guiding into position for engaging with one or other of the arms KK^1) is effected by a segment which has a counterbalance pivoted to it; the segment being pivoted to the arms K K^1.

Safety Stop-Cocks for Gas-Stoves.

WILSON, W., of Armley, near Leeds.

No. 13,161; June 7, 1906.

This invention (relating to safety cocks or valves for gas-stoves, water-heaters, or the like) has for its object to provide a valve or cock with a bye-pass arranged in such a manner that, until the valve spindle on which the bye-pass is mounted is turned towards the burners, the gas supply will not pass, and so that the valve cannot be operated until the bye-pass tap is turned on; the bye-pass tap being provided with a catch arranged so that the catch will be in contact with a suitable stop until the tap is opened.



Wilson's Safety Stop-Cock for Gas-Stoves.

The working of the stop-cock will be clear from the accompanying engraving—a front elevation showing the improvement applied to a fitting for a duplex burner, and a part sectional elevation of the valve and bye-pass.

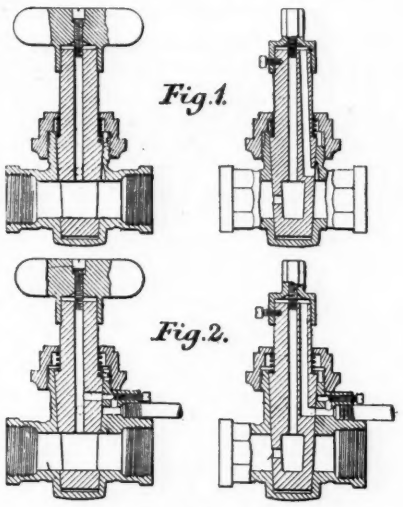
Bye-Pass Gas-Burner Taps.

BARTLETT, F. G., of Bristol.

No. 15,663; July 11, 1906.

This invention applies to cases where the bye-pass gas goes to the main burners, as well as where the bye-pass gas goes to pilot lights in more or less close proximity to the main burners or in them.

In cases of the first kind (see fig. 1), the bye-pass is effected, from the inlet side of the tap plug to the outlet side, through the plug, towards the lower end of which is a bye-pass inlet port, which opens into the main gas-way of the plug. Thence, when the bye-pass is open, the gas flows up through a passage in the plug to a space below the crutch cap; the amount passing being regulated by the usual controlling screw passed down from the top of the crutch. The regulated quantity descends a second passage in the plug and passes out by a port in the plug side into a cavity or channel in the tap body, and which opens into the main bore of the tap on the outlet side of the plug. By turning the plug through a quarter-of-a-circle (the range of turn being governed by a stop pin), the bye-pass is closed and the main gas-way through the plug is open to the main pipe.



Bartlett's Bye-Pass Gas-Taps.

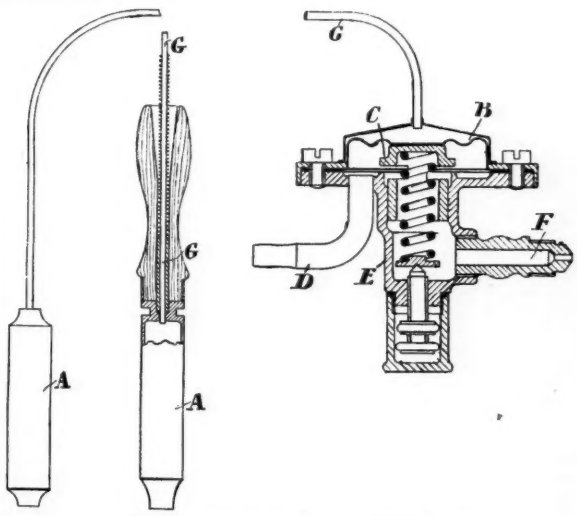
As applied to cases where the gas for the burners is supplied through the main, and the gas for the pilot lights is supplied by way of the bye-pass (fig. 2), a bye-pass main pipe is provided, in going to which the bye-pass gas takes one of two ways. It goes by one way when the tap is closed, and by the other when it is open. An additional regulating device is provided for controlling the bye-pass gas in the course taken by it to the bye-pass main pipe when the tap is opened to the main burners.

Regulating Device for Gas-Stoves.

JUNKERS, H., of Aix-la-Chapelle.

No. 16,323; July 19, 1906.

This device for the automatic regulation of gas-cooking apparatus is of the type in which the supply of gas is regulated by the variations in pressure of a gaseous or liquid medium when subjected to the thermal influence of the heated vessel or its contents, and is characterized by the pressure being transmitted from a sensitive cap through a flexible metal pipe permanently connected at one end to the cap and at the other end to a valve-chamber, within which is a metal diaphragm or like pressure member enclosing the medium in a permanent manner and freely communicating its variations in pressure to the valve. The flexible metallic tube is formed with helical grooves or is covered with a protective or non-conducting sheath, with or without a handle of non-conducting substance.



Junkers' Automatic Regulator for Gas-Stoves.

The operation of the device (shown) is as follows: Under the influence of the heat of the vessel itself or its contents being heated, the substance contained in the sensitive cap A expands, vaporizes, or otherwise increases the pressure within the cap and tube. This pressure is transmitted to the diaphragm B, which, by means of the valve C, throttles or controls, to a greater or less extent, the quantity of gas passing from the pipe D into the casing E, and thence, through the pipe F, to the cooking apparatus. This throttling takes place in such a manner that when the temperature of the vessel or its contents is lower (and consequently the pressure in the cap and tube is less) more gas passes to the burner; but when the temperature is higher, the pressure is greater, and a smaller quantity is allowed to pass. The supply is thus automatically regulated by the temperature of the article being heated.

Instead of the diaphragm B, some other device capable of movement in a similar manner under the influence of pressure can be used—as,

for example, a Bourdon tube or the like. Owing to the sensitive cap A being connected to the cover by a thin flexible metal tube G, not only can the cap be easily manipulated, but, owing to the absence of rubber connections or other destructible parts, the device has "great durability, and is consequently reliable."

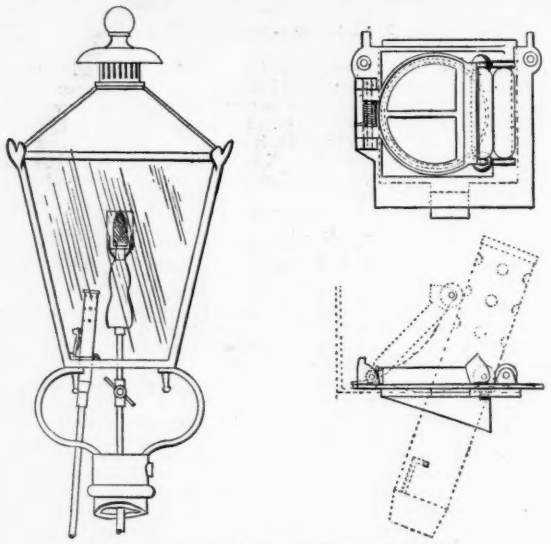
As a rule, the cap A is formed of metal, so that the tube G can be soldered to it. If made of (say) glass, a thin platinum tube can be used to form the connection—the glass being melted around the platinum, and the flexible tube soldered to it. In some cases, the single thin metal tube is replaced by a series of parallel thin tubes of small diameter, so as to still further increase the flexibility.

Street and Other Lanterns.

EDGAR, W., of Hammersmith.

No. 15,970; July 14, 1906.

This invention relates to gas-lanterns in which incandescent mantles are used, and which possess the following characteristics: The door is fitted on the outer frame of the lantern and is provided with a roller on its free edge; one edge of the opening is provided with a roller; a cushion is provided for the door to fall on; and the door is spring controlled. The object of the invention is to ensure a proper passage for the torch through the opening, without fear of it catching against the framing of the lamp, and to ensure that the door shall be properly closed after each withdrawal of the torch. The patentee also claims to have constructed "an improved buffer or cushion, or buffers or cushions, adjustable or not, for the door to fall on, and so prevent breaking of the glass or sudden shocks being imparted to the mantle."



Edgar's Street-Lantern for Incandescent Lighting.

The invention will be understood from the accompanying illustrations—a plan of one form of door and its frame; a side elevation showing the usual lighting torch inserted; and an elevation of a lamp and its column with a torch inserted to light the gas.

Price-Varying Mechanism for Prepayment Meters.

WILSON, G., of 's Gravenhage, Holland.

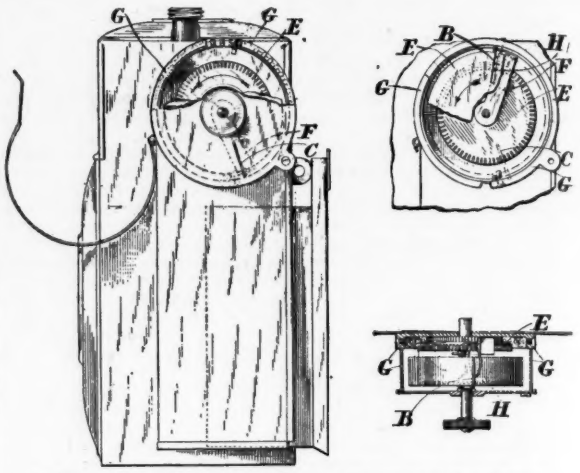
No. 17,225; July 31, 1906.

This mechanism comprises the combination with a movable member (into which a coin is inserted) and a toothed member (adapted to be locked to the movable member by the coin) of a shield moving with the movable member and preventing such locking until arrested by a stop. The stop is adjustable in position for varying the price of the commodity being measured.

The illustration shows a side elevation partly in section of one embodiment of the invention attached to a gas-meter, a side elevation, partly in section, of the price-varying mechanism, and a plan, partly in section, of the same.

The meter drum is provided with a pocket B, into which a coin may be inserted through a slot C in the casing. A crown-wheel E faces the drum, and is connected to the "crediting" part of the meter—*i.e.*, the part of the mechanism which has to be moved through a certain amount to allow the gas to pass through the meter and be registered. This "crediting" mechanism may be of any desired type. Between the drum and the crown-wheel is a shield F, provided at its end with a projection which moves over the crown wheel. It is also provided with a spring on the side facing the drum. Surrounding the crown-wheel is a ring G having a number of screw-threaded holes in it, into one of which a stop is screwed. An extension of the ring G forms a casing for the drum and crown-wheel. A stop is provided on the drum and a stop on the ring. The drum is also provided with a stop which engages with a stop on the ring surrounding it, for the purpose of preventing its complete rotation. Within the drum a spring H is provided, which crosses the pocket B and moves through slots cut in its side walls.

The shield and drum being in the position shown, a coin is inserted in the pocket B. In forcing the coin into the pocket, the spring H is first moved to allow it to pass and then partly returns. The coin is therefore pressed against the shield F by the spring H, aided by the spring on the shield F. The drum is then rotated in the direction of the arrow, the shield held by the pressure of the coin moving with it. After this the coin moves on with the drum, and is pressed by the spring H into engagement with one of the teeth of the crown-wheel E; and on continuing the rotation of the drum, the crown-wheel is rotated until the coin-pocket arrives above a slot, when the coin, aided by the action of the spring H, falls into the money-box below. Before another coin can be inserted, the handle, and with it the drum, must be turned back on account of the stops—the stop on the drum serving to bring the shield back into the position shown. By moving the stop in the ring G, it is obvious that the amount through which the crown-wheel E is rotated on the insertion of each coin can be varied, and therefore the amount of gas supplied to the consumer. The stop prevents the shield F moving downwards away from the position shown.



Wilson's Price-Varying Mechanism for Prepayment Gas-Meters.

The shield F, in addition to serving the purpose described, also prevents the meter being fraudulently operated by a strip of metal or a wire.

The mechanism may conveniently be encased as shown—a circular plate covering the prepayment mechanism. The casing beneath, into which the money-box can slide, is hinged so that it can be moved to cover the ring G, which may be locked to the hasp shown.

Measuring Gas Pressures.

BRUYN, P. DE, of Düsseldorf, Germany.

No. 24,311; Oct. 31, 1906.

This invention relates to apparatus for measuring gas pressures where the gas pressure acting under a bell provided with a float causes the bell and float to rise to a height corresponding to the pressure. In such apparatus as hitherto constructed (which are based on hydrostatic action, and which comprise a bell and float), intercommunicating bodies of liquids have been employed for their sealing and support. This has the result that variations in the level of one body of liquid or in the gas pressure acting upon the body of liquid entail corresponding variations in the level of the other body of liquid, so that an alteration in the statical conditions of one portion of the apparatus has influenced the other part. But in the apparatus according to this invention, the bell and float are arranged to dip in bodies of liquid completely separate from each other, so that mutual influence of the levels of the liquids on each other is avoided, and the "indications of the pressures are rendered more steady."

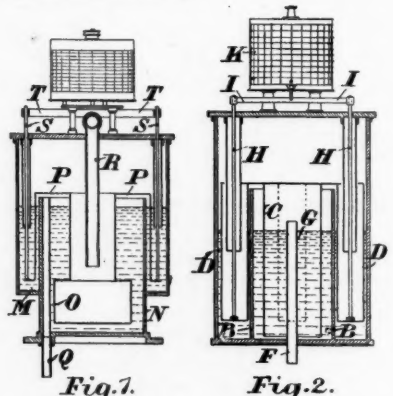
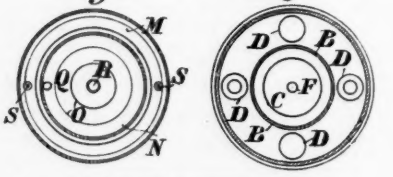


Fig. 1. Fig. 2.



De Bruyn's Pressure Recorder.

The illustrations show two practical constructions of apparatus for measuring gas pressures according to this invention—a central vertical section and a horizontal cross section.

Referring first to fig. 2, the (preferably) cylindrical vessel is divided by a cylindrical inset vessel B into two chambers completely separated from each other. Both chambers are filled to a certain level with liquid; and in the space enclosed by the vessel B there dips a bell C, which is connected to floats D. A tube F extends through the bottom of the vessel up beyond the level G of the liquid, and leads the gas (the pressure of which it is desired to measure) under the bell C. The movement of the floats is transmitted by rods H I to recording apparatus K in the usual way. The extent of movement of the floats is dependent solely on the greater or less buoyancy of the floats that is produced by the variation of the gas pressure acting under the bell C; the liquids in the vessels having no influence on the indication of the pressure.

The construction shown in fig. 1 is specially adapted for measuring differential pressures. In this construction the measuring vessel is similarly composed of two concentric vessels containing respectively bodies of liquid M and N completely separate from each other. The float O is immersed in the inner vessel; while the outer vessel M contains the bell P that is fixed to the float O. One gas supply enters below the bell P through the pipe Q, and the other passes above the bell through the pipe R. Rods S, mounted on the bell, extend through the top of the outer vessel, and transmit, by means of the cross piece T, the movement of the float O to the recording apparatus.

Temporarily Plugging Gas-Mains.

WHITE, J. H., of Jersey City, U.S.A.

No. 16,780; July 25, 1906.

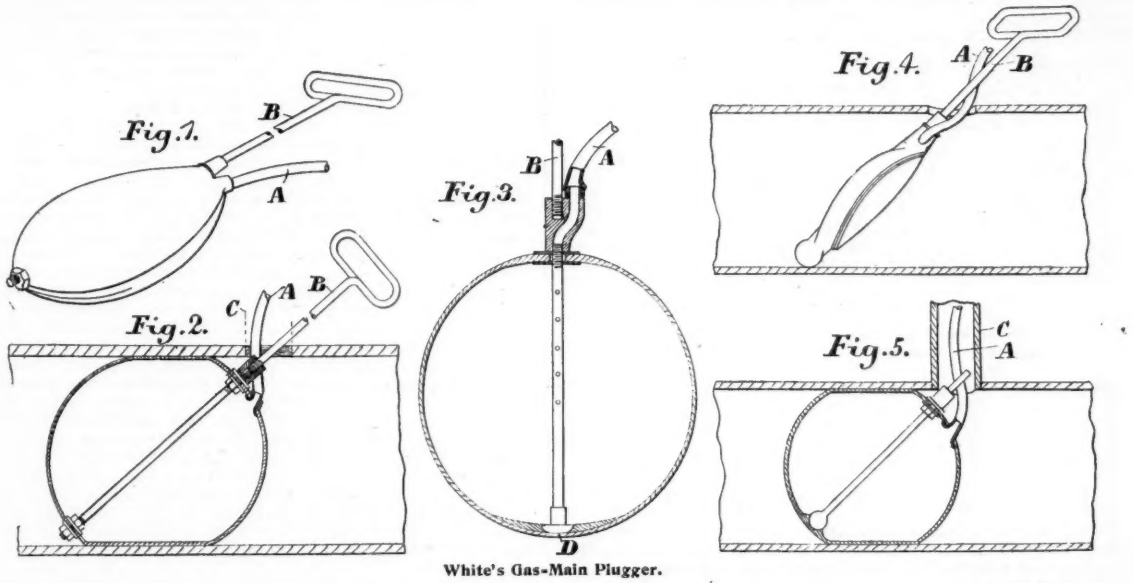
This invention relating to means for temporarily plugging gas-mains has for its object to put the bladder employed for the purpose fully under the control of the workman, and render it perfectly manageable throughout the inflating operation.

Fig. 1 is a perspective view of one form of the temporary plug—the bladder being shown deflated—while fig. 2 is a sectional view showing a main perforated and plugged by the device. Fig. 3 shows the preferred form of the bladder. Figs. 4 and 5 show the device when first inserted into the main, and after inflation in the main and the adjustment of the testing tube.

In operation, the thin and flexible material of the bladder is wrapped around the stock, which is then thrust through the perforation in the main, then, by giving the handle the proper inclination and thrusting it in until it comes in contact with the bottom of the main, the proper position is given to the bladder, which is then filled by the workman through the tube A, and caused to fill the main tightly. The tube is then temporarily sealed, and the handle B may then be unscrewed without disturbing the plug (although for some purposes it is unnecessary to remove the handle), and a short pipe C screwed in (as indicated by dotted lines in fig. 2) when the apparatus is being used for testing the main for a leak.

In the form seen at fig. 3, the stock is in the form of a perforated tube for the passage of air, and is provided at its lower end with a cap, having a knob portion to engage the pocket D. The wall of the bladder is preferably thickened at the lower end to compensate for the extra wear. The threaded sleeve or head at the top of the bag makes the construction more compact, so that it can be readily thrust through a relatively small perforation in the main.

The bladder is of thin material, which has no resiliency, and is limp and flabby and without form when not inflated, so that it lies against, and may be wrapped closely around, an interior guiding stock. Substantially all the plugging and inflating portions lie within the circumference of the main or are housed within the upright tube C when the main is being tested. This latter object is accomplished by having the stock controlled while inserting the bladder by an exterior handle B which is readily removed from interference with the adjustment of the test tube C, after the bladder is properly inserted and inflated; while the flexible inflating tube A is housed inside the tube C as shown in fig. 5.



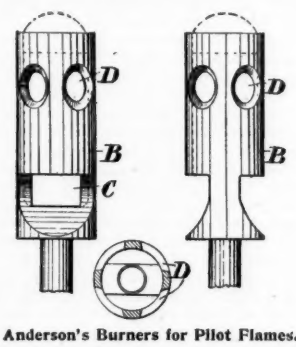
White's Gas-Main Plugger.

Burners for Pilot Flames.

ANDERSON, J., of Edinburgh.

No. 24,449; Nov. 1, 1906.

The object of this invention is to provide a pilot burner which will not be blown out by currents of wind when applied to lamps in exposed situations. The burner comprises a casing closed at the top for the flame, and provided with air supply holes at or near the point where the gas enters the casing, and also with additional side perforations near the upper end of the casing through which the gas from the main burner is ignited.



Anderson's Burners for Pilot Flames.

As shown, the gas is led to the bye-pass or pilot flame by a pipe having its exit in a casing B, provided with holes C, for the purpose of admitting air to the burner. The casing is closed at the top, and at the upper end are a number of vent holes D, preferably countersunk, "as a sharp outer edge has a tendency to cut off the flame from the upper holes when the wind blows upon it."

APPLICATIONS FOR LETTERS PATENT.

20.—DUNPHY, A. L., and TYSOE, J., "Inverted Burners." Jan. 1.
134.—CLERC, E., and BIDAULT, E., "Lighting and extinguishing gas." Jan. 2.
200.—M'MULLEN, J. A., "Gas-producers." Jan. 3.
203.—GLOVER, T., "Gas-meters." Jan. 3.
230.—DUNPHY, A. L., "Gas-governors." Jan. 3.
240.—WIGLEY, P., ARCULUS, G. N. & E. A., and WARRY, J., "Incandescent and other atmospheric gas-burners." Jan. 4.
270.—WILLIAMS, C., "Incandescent and asbestos gas-mantle." Jan. 4.
277.—PIRRIE, J. M., "Gas cookers." Jan. 4.

Suicides by Gas.—Poor health, together with business and financial worries, were apparently the causes of the suicide of John H. Parker, a company promoter and mining agent. Deceased, who arrived from the Transvaal some months ago, last Saturday week engaged a bedroom at a Kensington boarding-house. No answer could be obtained to repeated knocks at his door next morning; and when the room was entered, he was found lying dead on the floor with his head enveloped in his overcoat. He had cut the lead gas-pipe leading into the room, and had bent the open end of the pipe into his mouth. In the case of a Liverpool woman who committed suicide by placing in her mouth one end of a tube, the other end of which was connected with an open gas-bracket, her servant stated that she saw her mistress reading an evening paper which contained a report of an inquest held in regard to a similar death. The woman's husband stated that at one time she was in an asylum.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by our Correspondents.*]

The "Faking" of Photographs of Lighting Installations.

SIR,—We notice in your issue of Jan. 1 some remarks (p. 31), concerning "faked" night views, which we feel tempted to comment on.

As the firm who introduced night photography of gas installations, we should like to protest against the implication that, to be *bonâ fide*, a photograph must show the characteristics of your reproduction on p. 31. Such remarks are admirably calculated to strengthen the prejudice which your writer seems to share against an intelligent treatment of these subjects. The talk of "faking" in this connection is utterly misleading, as implying a false or unreal effect. The object of photographing a place by night is to show what it looks like—not to obtain certain records of blemishes incidental to the imperfections of the photographic plate. We have never understood, therefore, why men who usually know what they want should insist upon multiplying these meaningless splashes of light, which have no optical existence, and can only serve to confound one's ideas of the illuminating effect actually obtained.

If it is thought that such halations are a hallmark of "genuineness," we must beg to differ. It would be quite easy (both in the photographic printing and in the process-block making) to "improve" everything else and leave the halations in their virginal state. [As a matter of fact, this is what we have often seen done with inferior views of this kind.] We might as well say that a face was "faked," because certain blemishes emphasized by the photographic image were removed or subdued. It is as unintelligent to apply the term to a process which aims at nothing but counteracting the shortcomings of the plate, but absolutely introduces no feature which does not exist in the original.

Brixton, S.W., Jan. 7, 1907. BORUP BROS.

Hathersage and its Gas-Works.

SIR,—We notice a letter in the "JOURNAL" for the 8th inst., from Mr. T. Brown, and are much surprised at the statements he makes, which are not in accordance with the facts.

We deny having used any No. 12, 13, or 14, gauge sheets where No. 10 gauge were specified; but we do admit that some No. 11 gauge sheets did inadvertently get into the cupping. But these were replaced within a week of being found wrong; and our books will show that the sheets to replace were ordered from the makers some time before Mr. Brown called our attention to it. This shows clearly that it was not wilfully done.

This, however, was not the cause of the delay, as stated in your first short paragraph. It was caused by the choice of site, and alterations to specification necessitated thereby.

We do not wish to debate the matter through your columns, unless forced; the proper place for this being before the Directors.

Dewsbury, Jan. 12, 1907. J. FIRTH BLAKELEY AND CO.

Disposal of Ammoniacal Liquor in Small Works.

SIR,—With reference to Messrs. Biggs, Wall, and Co.'s letter in your issue of the 8th inst., I am pleased to hear that they are able to obtain such good results in practice. With a guarantee as to cost of production by their plant, also a further guarantee that the sulphate made shall realize an average net price of £12 per ton, "Gas Manager's" difficulty should be solved.

Jan. 12, 1907. S/A.

Loughborough Gas Undertaking.—The profit on the Loughborough Gas-Works for the half year to September last was £1844, which was somewhat less than that for the corresponding period of the previous year. This, said Alderman Bumpus, when presenting the accounts, was in the main owing to the fact that the expenditure was increased by £200. They usually put by certain items for repairs, which cost about this sum; and the amount was not included in the accounts a year ago, which made them look £200 worse. Allowing for this, the result was practically the same, which he thought was very satisfactory, seeing that they had had to face a considerable amount of competition from the electrical undertaking. The greatest help towards this result was occasioned by the number of prepayment consumers, who had increased in the six months by 211. There was also a slight increase in the ordinary cooking-stoves. This was a valuable aid towards meeting the loss caused by the electricity undertaking. The increase in the gas sold was 3¾ per cent.

A Defect in the Gas-Cooker.—The writer of "Notes on Gas Lighting" in the current number of the "Ironmonger" calls attention to a complaint recently made by one of the medical papers that the gas-stove cannot take the place of an ordinary coal-fired kitchen range as a refuse destructor, and says: "The common kind of gas-oven cannot well be employed to burn waste material; and in this particular respect it is undoubtedly inferior to the closed coal range. Many owners or hirers of gas-cookers keep their coal kitcheners alight in the winter, partly for the sake of a hot-water supply, and partly because the hot chimney and the convection from the plate help to warm the house. The advantages of the gas-cooker are most manifest in the summer, when there is less demand for hot baths; and the summer is just the time when periodical cremation of refuse is most desirable. If manufacturers could design some nice little crematorium fired by gas, in which egg-shells could be dissipated without notifying the whole neighbourhood, people with delicate nostrils and a sense of their responsibilities as citizens might perhaps come forward and purchase it freely."

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Friday, Jan. 11.

(*Before Mr. Justice* KEKEWICH.)

In re the Kent County Gaslight and Coke Company, Limited.

Two further motions by shareholders in this Company, asking to be relieved of their shares and get back the money they had paid, came before the Court to-day.

In the first case, Mr. BYRNE moved on behalf of Mr. Joseph Brierley, who said in his affidavit that he delayed taking proceedings until November by reason of the circulars he received from the Company, by which he was misled until he saw a report of Mr. Justice Joyce's judgment.

Mr. KIRBY, on behalf of the Company, submitted that the applicant ought to have taken proceedings earlier, and that in any case the presentation of the petition to wind up before the present motion was launched was a bar to its success. In support of this, he cited the case of *Tennant v. City of Glasgow Bank*, in the House of Lords. It was obvious, he said, that a winding-up order would be made, probably on the 21st inst., when the petition came on; and his Lordship would then have no jurisdiction in the matter.

Mr. BYRNE said his Lordship had jurisdiction now; and, even after winding-up, applications for rescission of contract could be made with the leave of the Court.

Mr. LAWRENCE, K.C., who appeared for the applicant in the other motion, also urged that no injustice would be done to any one by the order being made. If execution were issued upon it, it could be stayed pending the hearing of the petition, as had already been done in one case. It was by no means certain that an order would be made on the petition, as the Company were resisting it.

After some further observations by Mr. KIRBY,

Justice KEKEWICH, in giving judgment, said that, apart from the point raised as to the winding-up petition, the case was similar to those which recently came before him; but it was the weakest of them all in respect of the delay in taking proceedings. Still, though the applicant had, he thought, been partially blind, he did not think he had wilfully shut his eyes. He said in his affidavit (and he had not been cross-examined) that early in September he received a circular and telegram which satisfied him that Mr. Darwin was going to be a Director of the Company, though where the satisfaction came from it was difficult to see. Still he (his Lordship) could not say that his case would not come within the same rule as the previous ones. With regard to the presentation of the petition, he at first thought he ought not to make any order which might throw the least difficulty in the way of the Judge who dealt with the winding-up petition doing full justice between the parties; and he understood from Mr. Kirby that a winding-up order was inevitable. He now learnt that it was a contributory's petition; and if the majority of the contributories wished the Company to go on, a winding-up order need not be made, and he could not assume that it would be made. On the whole, therefore, he did not think he should do any real mischief by making an order, particularly as any proceedings under it could be stayed pending the winding-up. The case cited had no application, because there the Company was admittedly insolvent; but here there was no evidence of insolvency, and no creditor was petitioning. He should, therefore, make the same order as in the previous cases.

Mr. LAWRENCE said the other motion was on behalf of ten shareholders who joined together, each of whom had made an affidavit stating the circumstances under which he applied; and no notice had been given to cross-examine any of them. He therefore asked for the same order.

Mr. KIRBY having no further objection to offer, the order was made.

Liability for a Gas Explosion.

At the Stourbridge County Court last Thursday, before his Honour Judge Harrington and a Jury, an action was brought by Mr. Thomas Nock, of 19, Mill Street, Kidderminster, fruiterer, against the Kidderminster Gas Company, in respect of an explosion which occurred at his father's shop. Damages had been agreed between the parties; and the action was brought to determine whether the Company were liable on account of negligence. Mr. Waldron appeared for the plaintiff; Mr. Matthews represented the Company. Mr. Waldron said the plaintiff's father took the premises in question, situated in Blackwell Street, Kidderminster, for the purpose of carrying on his business as a fruiterer. They were taken in September, at which time there was no gas connection. On the 27th of September, the plaintiff's mother went to the Gas Company and arranged for the connection to be made. The Company suggested that a shilling slot meter should be put in. On the 28th, the Company sent a slot meter and a workman for the purpose of making the necessary connections. He submitted that the work was done negligently, thereby making the Company liable. Plaintiff was helping his father to prepare the shop for the opening. He went to the brewhouse, and on returning took up a lighted candle, and when opposite the door of the living-room an explosion occurred. He was severely burned, and was three weeks in the Kidderminster Infirmary. Mr. Matthews submitted that there was no case to go to the Jury. It was not the duty of the Company to see to the condition of plaintiff's fittings. When they had made the connection with the meter, their liability ceased. His Honour said he should direct that there was no case to go to the Jury. The explosion occurred from an escape of gas from the house piping; and the Gas Company had not contracted to see to that. It belonged to plaintiff; and in the absence of any contract between him and the Company to see to the fittings in the house, the latter were not liable.

MISCELLANEOUS NEWS.

NOTTINGHAM GAS CONTROVERSY.

A further stage of considerable importance was reached yesterday in relation to the Nottingham gas controversy, when a somewhat unexpected decision was arrived at, carrying with it consequences of a far-reaching character.

In accordance with the notice given on the previous Monday, a special meeting of the Council was held to consider a proposal by Mr. A. W. Black, M.P., a former Mayor of the city, that, in view of the notification from the President of the Local Government Board that he was not prepared to direct an inquiry into certain matters affecting the gas undertaking of the Corporation, the resolution passed by the Council on Dec. 3 with respect thereto should be rescinded. The resolution referred to was that, in the event of the Board refusing (as they have done) to order a public inquiry, and those who gave evidence before the Special Committee of Investigation refusing to consent to their statements being printed and distributed among members of the Council, the Council themselves should direct a full public inquiry, and that Sir Hugh Owen, or, failing him, Sir Albert Rollit, should be requested to conduct it. The adoption of Mr. Black's resolution would therefore have meant practically a closing of the whole matter; and upon the point whether or not this should be permitted the debate (which was of an exhaustive character) turned.

Mr. BLACK, in moving his resolution, traced the history and financial success of the gas undertaking since its acquisition from the old Gas Company in 1874; showing that under municipal control there had been great expansion of the works and substantial financial results. He said that in the past thirty years considerably over £603,000 had been paid out of the net profits in relief of rates; the average being £21,000 a year. Some four or five years ago, Sir George Livesey was called in to make a report on the undertaking; and Mr. J. H. Brown, the new Engineer, was likewise asked to present a report embodying suggestions. The result was that a certain reduction in candle power and alterations in relation to distributing apparatus were recommended. In time the reduction was made; but now, by common consent, it was admitted that it was made too soon. Sir George Livesey, in a later report, had said that it should not have been entered upon until the distributing arrangements had been so far perfected that a proper pressure could be maintained everywhere. With the reduction in candle power, the difficulties arose; the inefficiency of the distributing plant becoming more marked. It was clear that the difficulties, including the improper mixing of impure gas by one of the subordinates of the Manager, were well known to the Committee. The matter had since been well grappled with by the Committee; the experience of the last six or nine months being conclusive, inasmuch as complaints in regard to the gas had died down, if they had not altogether vanished. The President of the Local Government Board had been asked to hold an inquiry; but, as he had pointed out, he had no statutory power to summon witnesses or require evidence to be given on oath. Any arbitrator who was called in to act for the Council would be in precisely the same position. What sort of an inquiry, under the circumstances, could be held? It could not be as to the management of the gas undertaking, as this would require an expert; and it could not be suggested that either of the gentlemen who it had been proposed should act possessed expert knowledge in regard to the manufacture of gas. What was there, then, to inquire about? There were no charges made against any member of the late Committee; and there was no case for the Corporation to either prosecute or defend. Who was to take up the case, and present it to the Arbitrator or Court? Evidence could not be demanded or required from anybody; and, to his mind, the whole proceeding, from beginning to end, would be ludicrous and absurd. Why should the Corporation be asked to pay so many hundred guineas for an investigation which everybody knew from the outset would be in the nature of a purely farcical proceeding? He should be satisfied if, by his resolution, he saved the Council from making themselves a laughing-stock, and also from prolonging a controversy that could reflect no credit on the Corporation, and do no good under any possible circumstances.

Mr. SPALDING, who seconded the resolution, said he was not desirous in any way that the matter should be hushed up; but he felt it was a painful business, which was injurious to the good work of the Corporation, and more espcially of the new Gas Committee. It was in the best interests of the city to let the matter drop, so that the new Committee should not be hampered in the difficult task before them.

Mr. ELBORNE urged that the ratepayers were entitled to know what the evidence was which was given before the Special Committee of Investigation. It was, in his view, an extraordinary thing that, before the reply was received from the Local Government Board, provision was made, by Alderman Fraser's resolution, for an alternative course of action. If there was anything to induce the Local Government Board to say "No," it was such a proceeding as that. Consent having been given to the evidence being forwarded to the Local Government Board, why should not sanction be also forthcoming to its circulation among members of the Council? It was not so much the question of an inquiry, as of knowing what was said before the Special Committee. If the gentlemen who had given evidence were not willing that their statements should be published, the clear inference was that they did not care to say in public what they had stated in private. He opposed the resolution.

Dr. MILNER said he never entertained the idea that Mr. Burns would direct an inquiry, especially after the rather flippant manner in which he replied in the House to the question of the member for South Nottingham, to whom he suggested that the City Council should, if necessary, seek the aid of the police in the matter. An inquiry seemed to be practically useless; but he (Dr. Milner) thought that copies of the evidence given before the Special Committee should be distributed among the members of the Council. It was all very well to say that the public of Nottingham were sick and tired of the whole business. He did not think it was so. They had simply been awaiting the reply of the Local Government Board. The public feeling would not be set at rest so long as there was any idea that something was being kept back.

Mr. SANDS, a former member of the Gas Committee, who was one of the witnesses at the private inquiry, said that Mr. Elborne, as a lawyer, might have been expected to know there were good reasons for the refusal to give consent to the publication of the evidence. The statements which had been made by himself and other members of the late Committee were such as they were prepared to adhere to; and if the proper time came, they would repeat them. What they would not consent to in the matter was the exoneration of other persons in regard to the publication of their own statements. If they consented to the publication of the latter's evidence, they would be taking away from themselves the right to vindicate themselves from slanderous statements made by other people. The only reason, therefore, they refused the publication, was that they were not prepared to exonerate others from the consequences of their allegations.

Dr. DABELL said that during the recent municipal elections he pledged himself to support an inquiry into the matter, if the public desired it. Since then he had observed increasing evidence of the wish on the part of ratepayers that there should be further information forthcoming; and therefore he could not support Mr. Black's resolution. Since it had been stated that the evidence would not be made public, inference had become clear that something was said before the Special Committee which it was wished should not be published. The ratepayers, however, wanted to know what it was, and would not be satisfied without an inquiry of some kind.

Mr. SWAIN, a newly-elected member of the Council, also expressed his inability to support Mr. Black's proposal; stating that, during his recent municipal electoral campaign, he was again and again asked whether he would vote for an inquiry into the gas question. He replied in the affirmative in every case. He appealed to the majority in the Council to settle the matter once and for all to the satisfaction of the ratepayers. Personally he should have sufficient confidence in a Select Committee appointed by the Council to undertake the inquiry, whatever the political opinion of members of the Committee might be. The mistake which had been made from the beginning was to take the evidence in secret. He thought the main points were: Why did certain members of the Gas Committee resign; and why were charges which the Committee found were not proved against the Gas Engineer ever made?

Mr. PENDLETON said the Special Committee was appointed to inquire into the reason for supplying bad gas. He thought the Council would like to know whether they dealt with this important matter; and he appealed to Sir John M'Craith for an answer.

Sir J. T. M'CRAITH said the Committee did not go thoroughly into the question of bad gas, but they dealt with many matters which more or less led up to it. They came to the conclusion that they had not the power or the time to thoroughly overhaul the gas undertaking, as represented by the works and plant; and after thoroughly discussing the question, they arrived at the opinion that the better course would be for the new Committee to go into these matters and report forthwith to the Council. He could not vote for the resolution proposed that day. He quite appreciated the desire for fuller information. The Special Committee were forced to hold their meetings in secret, if evidence was to be taken. It seemed to him that every desire would be met if the alternative scheme of Alderman Fraser was accepted, asking consent to the publication of the evidence. He had always advocated that copies of the evidence should be supplied to members of the Council. From what Mr. Sands had said, his consent and that of some others who gave evidence could not be obtained. Therefore he (Sir John) urged that the Special Investigation Committee, or some other Committee, should hold an inquiry in public; and then all that was desired by the ratepayers would be attained.

Alderman FRASER said the point which had been made in the course of the discussion, that the evidence given before the Special Committee should be made public, was one which it was known could not be conceded. The evidence was taken in confidence; and upon this point the representatives of both the political parties on the Committee were pledged. He had no objection himself to the matter being inquired into by a fresh Committee, or to the evidence being taken in any way. Let it be done openly in the Council Chamber, or in any other manner they pleased. He was more determined than ever now, after hearing the speeches which had been made, that the whole of the matter should be, by some means or another, investigated.

Mr. PENDLETON moved—"That this Council is of opinion that a Select Committee of five members should be appointed to inquire into the supply and cause of the supply of bad gas." He thought ratepayers were entitled to know something about the amount of money invested in the water-gas plant at the Basford works, and not only invested, but sunk there. They wanted to know whether it was the Chairman of the Committee or the Engineer who advised the expenditure on that plant.

The MAYOR suggested that the terms of reference to the proposed new Committee should be that they should hold a public inquiry into the working of the gas undertaking during the last five years. He felt sure it was desirable that the inquiry should be kept within their own number, without calling in outside aid—care being taken that there should be no mystery, but the fullest possible publicity, in regard to the matter.

Sir J. T. M'CRAITH seconded Mr. Pendleton's amendment.

Alderman FRASER asked that, in the event of the amendment being accepted, the selection of the Committee should be deferred until the next meeting.

Sir JOHN M'CRAITH expressed agreement with this suggestion.

Ultimately the amendment, in altered terms suggested by the Mayor and accepted by Mr. Pendleton, was carried in the following form, with four dissentients only:—

> "That the resolution passed by the Council on Dec. 3 last, with reference to investigation into the gas undertaking, be rescinded, and that a Special Committee of five members be appointed to hold a public inquiry into the working of the gas undertaking during the past five years."

EXPLOSION AT THE DUBLIN GAS-WORKS.

Last Thursday morning, while the workmen were engaged on the revivifying floor situated under the purifiers at the works of the Alliance and Dublin Consumers' Gas Company, in Great Brunswick Street, some gas which (from an at present unknown cause) had collected beneath the purifiers, ignited, and the flame striking downwards came in contact with the workmen engaged on the floor, with the result that seventeen of them were more or less seriously injured. The ignition of the gas is attributable—so far as can be ascertained—to the fusion of an electric cable; electric lighting being solely adopted for lighting throughout the purifying department. Little damage has, however, been done to the plant; and the gas supply was not materially interfered with. After attention at the hospital, several of them were able to return to their homes; and others progressed favourably. One, however, it is reported, has since died.

Since the occurrence, Mr. W. F. Cotton, jun., the Engineer and Manager, has received numerous letters and telegrams of sympathy for the injured, and offers of help for himself and staff from many gas engineers and others throughout the United Kingdom. To all these friends Mr. Cotton desires us to convey the thanks of the Company and the suffering workmen.

EAST HULL GAS-WORKS PURCHASE BILL.

Ratepayers' Meeting.

Great interest has been taken locally in the proposal of the Hull Town Council to purchase the undertaking of the East Hull (or Sutton, Southcoates, and Drypool) Gas Company; and there was a crowded attendance last Thursday at the meeting of ratepayers which was called to express approval or disapproval of the Bill which will enable the scheme to be carried out.

The resolution in favour of the promotion of the Bill, so far as it refers to the acquisition of the gas-works, was moved by Alderman Larard, J.P., who said he had so strong a conviction that this step was taken in the best interests of the ratepayers, that the duty of commending it was a pleasure. It was opposed by those who viewed with alarm any municipal enterprise and dubbed it "municipal trading," and, naturally, it was opposed by interested parties. When the East Hull Gas Company went to Parliament last session for a Bill to extend their capital, the Corporation secured a clause; and they were now seeking to give effect to it. They had to promote a Bill this session or lose the opportunity for years; and if in years to come the ratepayers wanted to acquire the undertaking, they would have to buy it at a very much larger price, and under more difficult circumstances. It was significant that each time the Corporation had opposed the Company in Parliament, a reduction in the price of gas had been made; but if this Bill were rejected, there was nothing to prevent the Company putting on the 6d. they had just taken off. The Corporation wanted, before all, full possession of their streets; secondly, they argued that the policy of the Company had not been in the public interest; and, thirdly, they believed that, under careful management, they could make the undertaking a commercial success. As to the price, the divisible profit of the Company last year was £7500. The Corporation paid for the old Kingston works 18·89 years' purchase of the divisible profits; but suppose they had to buy the East Hull undertaking on a basis of 20 years' purchase, they would have to give £150,000 for the £100,000 actually invested. This would be a good return to the shareholders; and he was not frightened about making it a success on these terms.

The motion having been seconded, some discussion took place. Mr. Lambert, in moving a direct negative, remarked that no information had been given to show that the undertaking was not likely to cause serious loss to the ratepayers. The Company, he said, could not pay more than 5 per cent. on their new capital; and the price of gas must be automatically lowered when their reserve fund reached £10,000. There was no certainty that the Bill would be obtained; and if it were, they might have to pay 27 or 30 years' purchase, as well as compensate permanent officials and Directors. Opposition was also offered by Alderman Robson, a Director of the Company, who created some excitement by declaring that if the purchase were made on the terms of the Kingston Company, it would cost the Corporation over £1,000,000. He was a Director of the Kingston Gas Company, and for every £22 10s. paid-up, he got £150. He said that the Corporation would have to pay so much for borrowed money that the price of gas would have to be raised.

Alderman Rollit remarked that he approved of the purchase, because if the undertaking was not a good thing, the Company would not want to stick to it; and Alderman Larard, replying to the discussion, said the only compensation the Directors would get would have to come out of the price which was paid to the Company.

The resolution was then put. The voting was nearly equal; but the declaration of the Mayor (Alderman H. Feldman, J.P.) that the resolution was carried was not challenged. In response to a question from a member of the audience, Mr. Lambert was understood to say that a poll would be demanded.

Articles both for and against the scheme have appeared in the local Press, the "Yorkshire Post" having published one, in the course of which the following statement is made.

In respect of its gas supply, Hull occupies a peculiar, if not a unique, position. Until recently, the town was in the hands of three Companies—the eastern portion being supplied by the Sutton, Southcoates, and Drypool [now the East Hull] Company; the area within the docks by the now defunct Kingston-upon Hull Gas Company; and the rest of the city by the British Gaslight Company, whose works are at Sculcoates. A few years ago the Corporation purchased the undertaking of the Kingston-upon-Hull Gas Company, and instead of carrying on the manufacture of gas, the City Fathers placed themselves in the position of the "middleman" of commerce. They made an arrangement with the British Gaslight Company to take gas from them in bulk at a fixed price of 1s. 6d. per 1000 cubic feet; and they sell it to the consumers at 2s. 6d. The balance of 1s. per 1000 feet is used to defray the cost of public lighting in that part of the old town, the cost of distribution, and the payment of interest and sinking fund to eventually extinguish the debt. It is interesting to note that the old works were acquired for £94,000, which was equal to about 19 years' purchase, and that in eight years the Corporation have been able to pay off £23,540 in interest and sinking fund charges; the consumers have saved £11,476 in reduced charges for gas; and there is a balance in hand of £1944. In addition, by the removal of the old works they obtained a splendid site, which is now being utilized for the erection of new Law Courts and the extension of the Town Hall. This bargain seems to serve a useful purpose in the present campaign.

MANCHESTER GAS-WORKS EXTENSIONS.

£300,000 to be Borrowed.

At the Meeting of the Manchester City Council last Wednesday, Alderman Gibson, the Chairman of the Gas Committee, moved a resolution authorizing the Committee to apply for leave to borrow £300,000 for the purposes of the gas undertaking. He said that the Committee wanted £100,000 for a new 10 million cubic feet gasholder, £44,000 for the completion of No. 2 retort-house at Gaythorn, £54,000 for mains and service-pipes, £42,000 for meters, and £60,000 for cooking-stoves. He pointed out that the construction of a large holder was cheaper in proportion than a small one. Moreover, he held it to be good policy to have storage capacity equivalent to one day's producing power, which the Committee had not now. They must provide for the future. In 1895, the number of gas consumers was 82,289; whereas in 1906 it was 160,113. The average increase per annum the last twelve years had been 3½ per cent.; but the increase last year was 6 per cent. The number of stoves in 1895 was 3379; and last year it was 29,760—an increase of 26,641.

The motion having been seconded, Mr. Bowie asked what was the gross debt of the Gas Department; and Mr. Sutton inquired whether it was debt or capital. To these queries, Mr. Hart added the suggestion that Alderman Gibson should state what the assets of the undertaking were.

In reply, Alderman Gibson said that ten years ago the reserve fund stood at £39,499; and to-day it was £147,607. In ten years they had paid off by the action of the sinking fund £344,977. During the same period, they had charged against revenue for renewal of plant £315,413, and paid out of profits for the relief of the rates £517,855. They had also in ten years paid out of surplus profits for extensions of works, where borrowing powers had not been granted, and for the extinction of consolidated 4 per cent. stock, £100,746, and added £887,037 to the capital. In short, the assets had increased in ten years by 49 per cent., and the liabilities by 40 per cent. During the same period, the number of consumers had increased from 82,289 to 152,165, of whom 47,865 used prepayment meters. The mortgage debt on the undertaking in 1895 was £828,627, or £10 1s. 4d. per consumer; and in 1905 it was £1,245,815, or £8 3s. 8d. per consumer.

This explanation was received with applause; and the resolution was then carried unanimously.

BIRKDALE AND THE TESTING OF SOUTHPORT GAS.

A Board of Trade Arbitration.

Once more the Southport Corporation and the Birkdale Urban District Council are at variance over a matter appertaining to the gas supply by the Corporation to the Council's district. The point in dispute is as to the burner to be used for testing; and it has involved a Board of Trade arbitration.

Under the Act by which Southport supplies Birkdale with gas, it is provided that tests shall be carried out with the "London" argand No. 1 burner, or such other burner as may be approved by the Board of Trade, on the application of either party; and Southport is now wishful to change over to the "Metropolitan" No. 2 burner, the use of which it is argued has been sanctioned by the Board of Trade in the Metropolis and many other places. Birkdale have, however, found themselves unable to agree to this alteration; their contention being that the "Metropolitan" No. 2 burner, with the same gas, would show from 2 to 3 candle power more than the "London" No. 1. It was under these circumstances that, a few days before Christmas, the parties waited upon the Hon. T. H. W. Pelham, and two other members of the Board of Trade, in London, to ask them to settle the dispute. Both sides were heard; and the Board's decision is expected to be made known shortly. It may be mentioned that at the inquiry the Southport Corporation were represented by Sir George Livesey, Alderman Travis (the Chairman of the Gas Committee), Mr. J. E. Jarratt (the Town Clerk), and Mr. J. Bond (the Gas Engineer). Those attending on behalf of the Birkdale Council were Mr. Pye and Mr. Hayes (Chairman and ex-Chairman respectively of the Lighting Committee), Mr. Isaac Carr, and Mr. J. G. Newbigging.

As mentioned above, Birkdale argue that the use of the "Metropolitan" No. 2 burner would result in the same gas showing from 2 to 3 candle power higher than when tested by the "London" No. 1 burner; and they further contend that the burner is structurally inefficient, inasmuch as air can be admitted to it, and the light regulated, at the will of the tester. Consequently they say that, for the same quality of gas as is now used, the consumers will have to pay from 2d. to 3d. more per 1000 cubic feet. In fact, Birkdale's case is clearly set forth in a letter addressed by the Clerk of the Council to the Board of Trade, in which the writer says:—

> "I am directed to call your attention to the fact that . . . the Town Clerk of Southport admits a loss to the consumer both

with respect to the illuminating power and calorific value. In considering the application of the Corporation, my Council desire to point out that, although Birkdale is within the limits of the Southport gas area, the Corporation are required, by section 43 of the Southport Improvement Act, 1871, to pay to the Birkdale Council the sum of 3½d. per 1000 cubic feet for the right to supply private consumers in Birkdale with gas, and an additional payment of 4½d. per 1000 cubic feet for the use of the gas-mains in Birkdale, which are owned and kept in repair by the Birkdale Council. The benefit which will accrue to the Corporation, the Town Clerk has admitted, cannot, under existing circumstances, be shared in any way by Birkdale; but, on the contrary, it will inflict a loss on the Birkdale gas consumers, and at the same time go to increase the enormous profits of the Corporation from their gas undertaking. My Council strongly object to the adoption of the No. 2 "Metropolitan" argand burner, for the reasons herein mentioned; and they have every confidence in leaving themselves in the hands of your honourable Board for protection."

Briefly, the attitude of Southport is that, as the "Metropolitan" No. 2 burner has received parliamentary sanction, nothing can be said against its being a better burner for testing with than the "London" No. 1. The Southport supply is made up of about two-thirds coal gas and one-third carburetted water gas; and it is maintained that, as with the latter the quantity of air required to produce a good flame for testing purposes is less than would be needed if the gas were all of it coal gas, the Corporation are entitled to vary the air supply. It is denied that the use of the proposed burner will result in any such saving in the cost of gas as is anticipated by Birkdale; but, at the same time, if any saving should be realized, it is the intention of Southport to give the consumer the benefit of it. Alderman Travis himself calculates that there will be a saving of about ¾d. per 1000 cubic feet in the cost of manufacture; and his view is that the difference in the calorific value of the gas would be so slight with incandescent lighting that the consumer would never know it, while if he obtained his gas cheaper as a consequence he would feel the benefit.

GAS MATTERS IN BELFAST.

Depreciation and Reserve.

At the Meeting of the Belfast Gas Committee last Friday week, the Manager (Mr. James Stelfox) stated that on Christmas Eve, which was a very dark and wet day, the output from the gas-works totalled 10,806,021 cubic feet, which established a record; the previous record being that of Sept. 21, 1905, when the output was 9,904,080 cubic feet. The Clerk (Mr. Getty) read a memorial from 42 inhabitants of the Cregagh district, stating that they were prepared to take gas into their houses at a rate of 3s. per 1000 cubic feet. Mr. Stelfox explained that this extension would necessitate the laying of about 1800 yards of main. It was decided that the work should be proceeded with, and gas supplied to the memorialists on the terms stated.

There was a lengthy discussion of a recommendation made by the Accountant (Mr. D. Creighton) in regard to the establishment of a reserve fund. Mr. Creighton explained that in the Local Government Board Auditor's report, dated the 1st ult., the following words occurred: "Up to the present, no allowance has been made for depreciation in connection with the general capital expenditure, which has now reached a total of nearly £900,000; and there is no reserve fund in existence to provide for any special expenditure—such as, for example, the cost of the renewal of a gasholder or retort-house—which may become necessary before very long, and must be met out of the revenue of the undertaking." Mr. Creighton said he agreed with the Auditor that something should be done in the direction indicated by him; and he would suggest that the large balance of £61,338 standing at the credit of net revenue account be dealt with as follows: Write off general expenditure item a depreciation of 2½ per cent., equivalent to £22,188; write off automatic meters item a depreciation of 10 per cent., equal to £2988; and carry to reserve fund £30,000. This would leave a balance of £6162. The contribution to depreciation would bring up the amount to £87,353, or an average of 8 per cent., on the total capital expenditure. The reserve fund could be used for any contingency that might arise. Besides, he said, as the Committee were aware, the Local Government Board had recently issued an order prohibiting local authorities from overdrawing their banking accounts; so that it would be important to have such a fund, which he presumed could be used for working capital if necessary. A resolution recommending the Council to carry out Mr. Creighton's suggestion was unanimously agreed to.

New Lighting Contract for Colombo.

We learn from the Secretary and General Manager of the Colombo Gas and Water Company, Limited (Mr. S. Wellington, F.C.S.), that the Company have lately concluded with the Municipality a new contract for lighting the city. The principal features of interest are that the gas is to be of 10-candle power only, and of a thermal value of 400 B.Th.U. The illuminating power of the street-lamps is guaranteed at 60 candles; and they number at present some 2350. The Company have been successful in obtaining the withdrawal of the sulphur clauses, whereby they were penalized for anything above 20 grains of sulphur per 100 cubic feet. The Council have also agreed to purchase the remaining street-lamps (1215) at present the property of the Company. The new contract came into force on the 1st inst., and it will terminate on Dec. 31, 1916. The price of gas for power purposes is Rs. 3·50 per 1000 cubic feet, which will compare very favourably with other Oriental Gas Companies. Colombo now shares with Berlin the distinction of having reduced the illuminating power of its gas by 5 candles, and brought it down to as low as 10 candles. We learn also that the new Graving Dock at Colombo is being fitted with incandescent gas, and also the new Central Railway Station of the Ceylon Government Railways.

SULPHATE OF AMMONIA MARKET.

Messrs. Bradbury and Hirsch's Review for the Past Year.

We have received from Messrs. Bradbury and Hirsch, of Liverpool, a copy of their "Review of the Market for Sulphate of Ammonia during 1906;" and, as on previous occasions, we extract from it the portions with which our readers are most closely concerned.

Following their usual practice, Messrs. Bradbury and Hirsch offer a few observations upon trade and manufacture in general, and upon the fertilizer trade, before proceeding to review the markets for sulphate of ammonia and nitrate of soda. A year ago, they were able to record a decided improvement in most branches of industry and commerce, with every prospect of further development. The most sanguine, however, hardly expected such a record as the past year discloses, not only in the United Kingdom but the world over—any exceptions being due to special causes. In the United Kingdom, the coal, iron and steel, and all dependent industries, were exceptionally busy with home and export orders. The United States and Germany—now the largest iron and steel countries—have not been able to supply all their requirements, but instead of "dumping" surpluses upon our market, as was the case not long ago, they have been obliged to turn to this country for supplies. The fertilizer trade has also had its innings, and has had an extremely busy time both on the Continent and in the United Kingdom. So much has this been the case, that for months past very few of the export manufacturers have been able to book further important export orders for near delivery; while some of them have been hard put to it to fulfil existing contracts. All these things testify to a very rapid increase in the world's requirements in every department of life, and promise well for the current year. The only regret is that sulphate of ammonia manufacturers should not have been able in 1906 to share in the general prosperity, owing to circumstances which will be discussed at a later stage in the report.

Although the sulphate of ammonia trade is the *raison d'être* of their review, Messrs. Bradbury and Hirsch deal first with the nitrate of soda situation, because of its important bearing upon the market for their staple article. They quite admit that the nitrate of soda factor is not the only one to be considered; and they say it has probably been of less importance than the largely increased output of sulphate of ammonia during the past twelve months. But without a fairly clear view of the nitrate situation, it would be useless for them to attempt any forecast of the sulphate market, which, of course, is what their friends are chiefly interested in. They therefore first address themselves to a short review of the nitrate market.

At the end of 1905, they calculated that the supply of nitrate for the ensuing four months would be somewhere about 778,000 tons; and the actual supply proved to be 769,300 tons, or 8700 tons less than their estimate. The deliveries from ports were 722,770 tons; and the stocks carried forward into May, 46,530 tons. They say this shortage is not easy to account for; the highly remunerative level of prices current, and the uncertainty as to the terms upon which the Combination could be renewed, if it could be renewed, affording every reason for pushing supplies forward as rapidly as possible. When it became known in May that the Combination, which had been renewed for three years at the end of March, had fixed the maximum quantity permitted to be shipped between April, 1906, and March, 1907, at 43½ million quintals—85 per cent. up to the end of December—there was something like a panic on the Continental market, and a heavy fall in prices. Other circumstances perhaps contributed; but the action of the Combination was the main cause of the consternation. Forthwith sellers began to realize, at any prices obtainable, not only stocks, but anything near at hand, though, singular to relate, the forward position was not very much affected. But a saner view of the situation supervened. Reflection brought into prominence the fact that the quantity agreed upon by the Combination was only the maximum permitted to be shipped, and that in no recent year had shipments reached the maximum within several million quintals, notwithstanding the inducement of high prices. Moreover, it was observed that while Europe was more or less hysterical, producers, who could best judge of the probable effect of the Combination's decision upon production, were not at all upset; and first suspicion, then conviction, began to spread that, after all, it was true that production was limited by labour supply, and that capacity to produce did not greatly exceed the previous year's output. Within three months the April level of prices was restored. Panic being replaced by confidence, and stocks in Europe being moderate, steady buying was resumed in June, and was well sustained right up to November; the visible supply at the end of October being actually 34,000 tons less than that at the end of October, 1905. In November, advices of heavy shipments being made began to disturb the minds of holders. The conversion of a shrinkage in visible supply at the end of October of 34,000 tons to an increase of 45,000 tons at the end of November, coupled with the anticipation of a further increase by the end of December, very materially altered the situation and opinion; and whereas previously buyers had been rather inclined to anticipate their requirements, since early in November they have stood steadfastly aloof.

Messrs. Bradbury and Hirsch do not think it can be said that at any time since January last has the nitrate market been overburdened with stocks. On the contrary, they have been kept within very moderate compass; so that, with the exception of a short time in May and June, spot prices have been maintained at a high level in relation to the forward position. In January, the price was 10s. 9d. per cwt., in February 11s., in March 11s. 3d., and in April 11s. 6d. In May, there was a drop to 11s.; but the lost ground had been recovered by September. In October, 11s. 10½d. per cwt. was reached—the highest price for the year. There was a decline to 11s. 3d. in November; and this was the closing quotation in December. Refined quality ranged from 3d. to 6d. per cwt. above the price of 95 per cent.; and, owing to scarcity, the difference in price was at times as much as 9d. per cwt. The authors do not think it necessary to follow the course of cargo business, which was exceptionally heavy; but in order to show the trend of the forward market, they give the prices delivered free

on board on the west coast. These steadily advanced from 7s. 3d. per quintal in January to 8s. 1½d. in April. There was a slight set-back in May, but it was short-lived; and in June 8s. 3d. per quintal became the price. From that time forward there was a rapid advance to 9s. 4d. per quintal in August. Later, up to 9s. 6d. was quoted; but as in the closing months of the year makers had practically nothing to sell for near delivery, quotations, which fell to about 8s. 6d. per quintal in December, were mainly nominal. Thus the nitrate of soda producing interest had a glorious time; and, while dividends were very substantially advanced, large sums were expended on new ground and plant or written off for depreciation. Messrs. Bradbury and Hirsch consider that the companies, without exception, stand to-day in a better and sounder position than at any period in their career, quite apart from the prospects of the current year. The visible supply (stock and afloat) for the United Kingdom and Continent at the end of 1906 was about 734,000 tons, compared with about 678,000 tons in 1905 and about 672,000 tons in 1904. The present visible supply is thus 56,000 tons more than that at the end of 1905, and 62,000 tons more than that at the end of 1904; but the quantity now loading is only about the same as at the end of the first-named year.

Coming to sulphate of ammonia, Messrs. Bradbury and Hirsch say that when discussing the situation a year ago they expressed grave doubts about the stability of the market over the spring months. The dominant factor seemed to be the rapidly increasing production in Germany; but the fortuitous circumstance of the colliery strike there in January and February, 1905, with its consequences, was, in their opinion, of scarcely less importance in its bearing upon the market in January to April—the period they had specially in view. The strike occasioned an extra Continental demand for British sulphate of probably 6000 to 8000 tons; and consequently it was necessary to count upon an equivalent falling off in demand during the spring of last year, seeing that there did not appear to be any prospect of another strike. They had also to take account of increasing production in the United Kingdom, from fresh carbonizing plant then coming into operation, as well as what might be expected from gas works and other sources. They had further to consider what larger outlets could be found for the extra supply thus occasioned; and they were scarcely able to find them. They assumed that the Continent would absorb increased German production. They looked for "much larger requirements for Spain;" they were of opinion that "contracts already existing assured increased shipments for Japan;" and they thought that sugar-growing Colonies "would take larger supplies." They also suggested that relative cheapness would probably induce some further reversion to the use of sulphate in the United Kingdom. Having considered all these points, they could not see sufficient to justify any such recovery in prices as was experienced in the early part of 1905, though relative cheapness might perhaps occasion a larger Continental demand than was anticipated. They did, however, look for a substantial recovery from the depression which had settled upon the market in the preceding month—December. Exports last year followed rather closely the lines they indicated as probable, as shown by their tables of shipments, from which we take the following figures: To France, Germany, and Belgium, 33,922 tons; to Spain, Italy, and the Canaries, 62,561 tons; to Holland, Java, British Guiana, the West Indies, and the Mauritius, 45,274 tons; to the United States, 13,345 tons; and to other countries, 46,354 tons (Japan taking 33,237 tons, against 33,861 tons in 1905, 14,981 tons in 1904, and 3612 tons in 1903)—making a total of 201,456 tons, against 189,349 tons in 1905, 177,287 tons in 1904, 162,217 tons in 1903, and 162,754 tons in 1902. Messrs. Bradbury and Hirsch say that, in view of all the export figures, it must be admitted that the market took the course that was inevitable, and this without in the least admitting that relative cheapness had nothing to do with demand. It was, in fact, causing the absorption of rapidly increasing Continental production, and an increase in home consumption, without which prices must inevitably have sunk to the level of actual nitrate of soda prices, or even lower.

After a few comments on the figures presented in the tables, Messrs. Bradbury and Hirsch say that if they follow the course of market prices they will find less to guide them in export figures than in other circumstances; for while there was practically no increase in exports from July up to November, when the market went to pieces, there was a very substantial advance in prices, culminating at the end of October. This was due primarily to the increasingly strong position of nitrate of soda. Operators argued that the sulphate market was bound to be affected advantageously; and in July they began to buy in the forward position—August-December at up to £12 2s. 6d. per ton, October-March at up to £12 5s. per ton, and January-June at up to £12 7s. 6d. per ton. In August the advanced ideas of makers choked buyers off, and they turned their attention to the spot market. In September further business was done in the forward position at about previous prices; but the spot market was not much affected thereby. In October, however, again owing mainly to nitrate of soda influences, there was keen buying for delivery ahead, at up to £12 7s. 6d. per ton for November-December, at £12 12s. 6d. per ton for delivery over the spring months, and at up to £12 10s. per ton for April-September f.o.b. Leith. Concurrently the spot market became very active, and there was large buying at up to £12 3s. 9d. per ton f.o.b. Hull. At other ports, more particularly in Scotland, much higher prices were paid; there being large actual requirements for late October and early November delivery. November witnessed a complete breakdown. When unprecedentedly large shipments of nitrate for November were seen to be assured, the nerves of the sulphate trade—buyers and sellers—received a shock; and on the part of buyers an attitude of indifference was immediately substituted for that of urgency. The forward position was left severely alone, while the spot market dropped to £12 per ton; the heavy shipments in November being mainly contracted for in October or earlier. In December the spot market gradually, but steadily, declined until £11 12s. 6d. was touched—the price current early in July. There was practically no first hand forward business done in this month, the large makes being already rather fully sold up to June; but there was speculative selling for delivery over the near months at a moderate premium on spot prices. The average price for the year, delivered f.o.b. Hull, is £12 0s. 9d. per ton; and in relation to the average price of nitrate, 95 per cent., at Liverpool, £11 6s. 7d. per ton, Messrs. Bradbury and Hirsch think it must be admitted that the result is disappointing. But when all the circumstances of the case are considered, they do not regard the price as being much below what the actual situation has justified. They do not see that the market has at any time suffered much from the operations of speculators. On the contrary, they think speculators have suffered more at the hands of the market. Certainly from July to November the ever-present consciousness of dear nitrate of soda limited the action of would-be "bears;" while it enabled makers to effect sales at prices which may possibly not again be reached during the running of the contracts.

Passing on to consider why the price of sulphate of ammonia has not attained and maintained an altogether higher level, having regard to the high prices for all other nitrogenous material, particularly nitrate of soda, Messrs. Bradbury and Hirsch say that, in the first place, and mainly, it is because of the very large increase in the European production. The increase in Germany alone is estimated at 25,000 to 30,000 tons, and that in the United Kingdom at 15,000 tons; while France accounts for a further 2000 tons. It is impossible to get at even approximate figures for other European countries; but by putting the increase at 8000 tons, they do not think they are going beyond the mark. Thus they have an aggregate increase of something like 50,000 tons; and they confine their remarks to these figures, since it is impossible to even guess at production outside Europe, and in any case it does not appreciably affect the European market. After a period of stagnation extending over 1903 and 1904, during which there was no increase in the output of sulphate of ammonia from gas-works, the days of expansion were resumed in 1905, and were continued through 1906. In the former period, electric lighting and the use of incandescent in place of ordinary gas-burners was very largely extended; neutralizing the natural increase in the consumption of gas on new property. Water gas was, moreover, being largely introduced. In the later period, there was not so much a substitution of one light for another, but rather the introduction of the better illuminants on new property. But inasmuch as these better illuminants do not find their way into comparatively small property or into all new mills and works, there has been something like the natural increase in the consumption of gas that was customary in former years, accentuated by exceptional activity in all industrial centres. The authors estimate the augmentation in the production of sulphate from this source at 6000 tons. There has again been an increase from carbonizing, more particularly in the Tyne district, estimated at 6000 tons. Further installations and extensions of the Mond gas process account for 3000 tons more; but from shale the output has probably not increased appreciably. Messrs. Bradbury and Hirsch estimate the production of ammonia, calculated into sulphate (including that used in the manufacture of ammonia soda and other chemical processes), from all sources in the United Kingdom, during the past year, at 283,500 tons.

	Tons.
Gas-works	162,000
Iron ,,	20,000
Shale ,,	46,000
Coke and carbonizing works and producer gas	55,500
	283,500

Of this production, they reckon that England contributed 186,000 tons; Scotland, 95,000 tons; and Ireland, 2500 tons. The output (in tons) during the previous five years was as follows:—

	1905.	1904.	1903.	1902.	1901.
Gas-works	156,000	150,000	150,000	150,000	143,000
Iron ,,	20,000	19,500	19,000	18,500	16,500
Shale ,,	46,000	42,500	37,500	37,000	40,000
Coke and carbonizing works and producer gas	46,500	33,500	27,500	23,500	18,000
Totals	268,500	245,500	234,000	229,000	217,500

The authors' estimate of production from all sources during 1905 proved to be decidedly below the mark; and their estimates of home consumption and of makers' stocks were similarly short. Assuming 15,000 tons for the stocks, including goods not delivered, the account for 1906 will stand as follows:—

	Tons.
Stock brought forward from 1905	15,000
Production in 1906	283,500
	298,500
Exports during 1906	201,500
Home consumption (for all purposes) in 1906	82,000
Stock to carry forward into 1907	15,000
	298,500

Messrs. Bradbury and Hirsch consider that, having regard to the industrial activity in the country, a further increase in production of sulphate of ammonia from gas-works must be expected; and the same may be looked for from carbonizing works. They do not think producer gas promises much expansion; and, so far as can be ascertained, the Scotch oil companies do not anticipate much increase in output. Therefore, although a substantial rise in the current year's production must be counted upon, it is not thought to be likely to exceed 5000 or 6000 tons within the next four months. Although advices from Germany do not point to any very large extensions of carbonizing plant in Westphalia, it is certain that the existing plant must be kept going at the highest pitch through the year in order to cope with the demand for coke; and there must be some extension, though it may not come into operation immediately. An increased make of sulphate compared with the output over the spring months of 1906 must therefore be looked for. If substantially increased production must be looked for in the United Kingdom and in Germany, if some increase elsewhere in Europe is assured, and if the United States should again be practically self-supporting over the first half of the year, to what countries are we to look for demand sufficient to absorb increased

production? The authors do not think it is too much to hope that the Continent will do more than absorb the increased German production, notwithstanding the set-back in nitrate of soda prices, because sulphate of ammonia is still relatively so much the cheaper article that the consumer who would have used sulphate had nitrate remained at the higher level will still use it. They are of opinion that reversion to the use of sulphate will go on, while increased production will be less than it was over the same period in 1906.

In the meantime, the German market is in the hands of German producers, and may be expected to remain there until a fair proportion of the make is sold. French requirements are certain to be larger than they were over the last spring season; French agriculturists being determined to substitute sulphate of ammonia for nitrate of soda as far as possible, and there not being much elasticity about home production. Spanish requirements over the early months of 1906 were exceptionally heavy; and it is doubtful whether they will be exceeded in 1907. However, it is not thought that there will be any falling off. Japan brought forward very considerable stocks from 1905 into 1906, and had, moreover, made large contracts for shipment in January to April; but buyers have adopted a different policy with regard to 1907. For some time they have been very cautious in their operations, and they are approaching the coming season with smaller stocks and with fewer contracts on their books. This policy may have been induced by larger supplies of other fertilizers; but it is also likely to have been dictated by the hope for lower prices. There have, in fact, been large inquiries on the market from Japan from time to time; and the question of price alone has prevented a much greater business. The authors think it would be unwise to dogmatize about the requirements of a country which has so recently emerged from abnormal conditions. All they venture to say, therefore, is that the 1906 level of requirements may very likely be maintained; and they do this on the strength of the extraordinary enterprise of the Japanese. The Colonies alone remain to be considered; and with reference to these Messrs. Bradbury and Hirsch point out that shipments during the past six months have dropped about 4598 tons. They do not, however, regard this fact as an indication that requirements are falling off. Rather, they think, it justifies the expectation that larger shipments will be required in the early months of the current year. It only remains to add that they look for increased demand in the home trade.

Apart from considerations which may in the main be special to the sulphate of ammonia trade, there is a general consideration to which the authors deem it necessary to call attention—the enormous extension in the use of fertilizers all the world over. So far this has been seen most in the superphosphate trade, and it has brought about a rapid advance in the price of the raw material. But superphosphate is not alone to be affected. In their opinion, its complementary constituents, nitrogen in particular, must proceed with it, not necessarily step by step, but very much that way; and whether it is taken in the shape of mixed manure or as raw material, the result must be the same—a larger general demand for nitrogenous material, of which sulphate of ammonia is by far the cheapest. Demand has been showing itself from many out-of-the-way places the trade never thought of a few years ago; and the authors think that in the aggregate this must be counted upon in the future. While, therefore, not taking a very sanguine view of the near future, they expect the market to right itself as the spring months are approached. For two months the market has been neglected by purchasers, who, as far as possible, have put off their buying. This policy must involve much larger buying later on, apart altogether from the question of the relative cheapness of sulphate of ammonia; and the expectation of a recovery to the level of October prices does not appear to them to be unreasonable.

The "Review" concludes with the usual record of the course of the market month by month; and this is followed by the customary tabulated statistics. The first table contains the comparative weekly prices of sulphate of ammonia and nitrate of soda last year. In the week ending Jan. 6, sulphate was 12s. 4½d. per cwt. and nitrate 10s. 9d.; on April 7, the prices were 12s. 3d. and 11s. 4½d.; at Midsummer, they were 11s. 9d. and 11s.; at Michaelmas they were each 11s. 10½d.; while at the close of the year they were 11s. 7½d. and 11s. 3d. respectively. The second table shows the average prices per cwt. of 95 per cent. nitrate of soda, in Liverpool, for the past ten years. They are as follows: 1897, 7s. 9½d.; 1898, 7s. 6½d.; 1899, 7s. 11¾d.; 1900, 8s. 5½d.; 1901, 8s. 11½d.; 1902, 9s. 4d.; 1903, 9s. 6½d.; 1904, 10s. 2½d.; 1905, 10s. 9½d.; and 1906, 11s. 4d. The third table gives the average prices per ton of good grey (24 per cent.) sulphate f.o.b. Hull; the figures ranging over 40 years—1867 to 1906. The following are the averages for the past ten years: 1897, £7 18s. 5d.; 1898, £9 9s. 7d.; 1899, £11 5s. 10d.; 1900, £11 2s.; 1901, £10 11s. 4d.; 1902, £11 16s. 3d.; 1903, £12 9s. 2d.; 1904, £12 3s. 8d.; 1905, £12 10s. 9d.; 1906, £12 0s. 9d.

Water Purchase Question at Beverley.—The Beverley Town Council have received a letter from the Local Government Board sanctioning the purchase of the local water-works undertaking for £21,350, but disapproving of the site of a proposed new bore, on the score of danger of contamination from sewage. They recommend that the bore should be taken further away; and they state that, if it proves satisfactory, the question of serving a larger area than the borough will be considered by the Board.

Trouble at the Wombwell Gas-Works.—A newspaper report states that a sensation has been caused in Wombwell on account of the gas-stokers employed by the Urban District Council having received fourr teen days' notice. It has been discovered (so it is said) that one os more of their number have been guilty of tampering with the process of gas production; and the officials having been unable to find out the culprit or culprits, have had no alternative but to give notice to the whole set. It is alleged that recently they have reduced the production by at least 50,000 cubic feet per day. The matter has been reported to the Council; and last Friday an inquiry was held at the Town Hall, at which one of the stokers was called upon to give evidence. A great many complaints have of late been made respecting the low pressure of gas and insufficient supply.

ENGLISH AND FOREIGN COMPANIES IN FRANCE.

In connection with the above subject, on which an article appears in another part of the "JOURNAL" the following letter, signed by M. Pellerin, of Paris, which was published in the "Financial News" on Monday last week, will probably be read with interest.

The French Chamber of Deputies, while discussing the "Loi des Finances, 1906," has lately passed Article 13 of the Bill; and, as such article contains stringent provisions affecting French, English, and Foreign companies contemplating issuing shares or debentures, or whose securities may be dealt with in France, too great publicity cannot be given to the provisions. They will take effect from and after Feb. 1 next, if confirmed by the Senate. The following are the provisions of this new enactment:

Commencing from Feb. 1, 1907, any issue, negotiation, offering for sale, or sale of shares, debentures, or securities of whatever nature, in France, of French or Foreign companies, must comply with the following rules: All posters, prospectuses, advertisements in newspapers, circulars, forms of subscription or purchase, must contain the following details: As regards shares and debentures, the full name of the company or style of the undertaking, the nationality thereof, the registered office, its objects, the duration thereof, the nominal amount of the capital, the nominal value of each share and the amount remaining uncalled thereon, and the last balance-sheet of the undertaking, or a statement that the same has not yet been drawn up. In the case of shares, the advantages stipulated in favour of the following persons must be set out—namely, the directors, the manager, or any other person; a full description of the property conveyed to the company by the vendors must be given, the price contracted to be paid for same, the mode of convening general meetings, and the places where same are to be held. In the case of debentures, the following must be set out: The amount of debentures already issued by the company, and upon what security, details of which must be given; the number and the nominal value of the new debentures to be issued, the interest to be borne by each, and the date and the conditions under which same will be paid off.

The formalities above alluded to must be certified in the form of a notice as having been complied with by the parties issuing the securities, who must be domiciled in France. This notice must, prior to any advertisement whatever being issued, be published in a "bulletin" annexed to the "Journal Officiel," the form of which will be settled by a special decree. The fact of this notice having appeared, with a reference to the number of the "Journal" containing the same, must be inserted in all posters, prospectuses, articles in newspapers, and forms of subscription or purchase. All Foreign companies making a public issue in France of shares or debentures must, in addition, publish in the same "bulletin" annexed to the "Journal Officiel;" and before any issue is made, the Memorandum and Articles of Association of the company in question *in extenso* (translated into French). Any failure to comply with the above regulations will incur a penalty of from 10,000 to 20,000 francs.

The Minister of Finance stated that these new provisions had been brought forward in consequence of the enormous losses sustained in France during late years by all classes of shareholders who have invested in companies launched by promoters who have taken advantage of the laxity prevailing in this country relating to the issuing of shares and debentures, &c. It will be noticed that the regulations contained in Article 13 are largely based upon the provisions of the English Companies Act of 1900.

GAS COMPANIES AND CAPITALIZATION.

The "Joint-Stock Companies' Journal" for the 9th inst. contains an interesting communicated article on the above subject. It opens with a reiteration of the well-known truism that the prosperity of an undertaking depends in a great measure upon the economy with which it has been capitalized; and then the writer goes on to show that to no concerns is the remark applicable to so great an extent as to gas companies. The welfare of these undertakings depends, of course, on the price charged for gas. If this is high, they feel the competition of electricity; but if it is low, such competition will be arrested. The price of gas ranges between 2s. and 3s. per 1000 cubic feet in the case of companies supplying annually more than 500 million cubic feet; and in these figures the capital charges will range between 6d. and 1s.—varying according to the economy with which the company was capitalized at its inception, and the subsequent policy of the directors in apportioning expenditure. The writer refers to some of the factors which may be said to directly influence the prosperity of gas companies; and though he mentions cheap carriage of the raw material as a matter of considerable moment, he says it sinks almost into insignificance in comparison with low capitalization. To illustrate the importance of this matter to gas undertakings, he has taken as examples the eighteen largest companies in the United Kingdom, all of which supply upwards of 500 million cubic feet of gas annually. They are divided into two Groups A and B, representing the companies with capital charges below and above 9d. per 1000 cubic feet respectively.

Group A.			Group B.		
Name of Company.	Pence per 1000 Cubic Feet Sold.	Price of Gas.	Name of Company.	Pence per 1000 Cubic Feet Sold.	Price of Gas.
		s. d.			s. d.
Plymouth . . .	5·33	1 9	Brentford . . .	9·27	2 9
Wandsworth . . .	6·69	2 0	West Ham . . .	9·60	2 10
Tottenham . . .	9·94	2 8	Commercial . . .	9·67	2 5
Bristol . . .	7·18	2 0	Croydon	9·73	2 8
Portsea Island . .	7·21	2 4	Derby	10·44	2 6
South Suburban . .	7·36	2 5	Brighton	11·37	2 10
Bath	7·56	2 1	Gaslight and Coke .	12·16	2 11
Sheffield	7·61	1 6	Dublin	14·35	3 2
South Metropolitan .	8·06	2 0			
Newcastle . . .	8·25	2 0			
Average . . .	7·22	2 1	Average . . .	10·82	2 9

Sliding-Scale Companies.

Name of Company.	Standard Div. Per Cent.	Standard Price of Gas.	Present Price of Gas.	Price Below Standard	Rate of Div. for Each 1d.	Total Dividend Allowed.
		s. d.	s. d.	d.	s. d.	£ s. d.
Gaslight . . .	4	3 4	2 11	5	2 8	4 13 4
S. Metropolitan.	4	3 1	2 0	13	2 8	5 14 8
Commercial . .	4	3 3	2 5	10	2 8	5 6 8
	3½	..	..	..	3 4	5 3 4
Brentford. . .	10	3 9	2 9	12	5 0	13 0 0
	7	..	..	..	..	10 0 0
Croydon . . .	10	4 7	2 8	23	5 0	15 15 0
	7	..	..	..	..	12 15 0
S. Suburban. .	5	2 10	2 5	5	2 6	5 12 6
Tottenham . .	5	3 8	2 8	12	2 6	6 10 0
	3½	..	..	..	..	5 0 0
Wandsworth. .	3½ B	4 0	2 0	24	2 6	6 10 0
	3½ C	..	..	..	1 9	5 12 0
West Ham . .	5	2 11	2 10	1	2 6	5 2 6
Brighton . . .	10	3 3	2 10	5	5 0	11 5 0
	7	..	..	..	..	8 5 0
Newcastle . .	3½	2 9	2 0	9	2 6	4 12 6
Plymouth . .	7½	2 6	1 9	9	5 0	9 15 0
	7	..	..	..	..	9 5 0
	5	..	..	..	2 6	6 2 6
Sheffield . . .	10 max.	4 0	1 6	30	5 0	10 0 0
	8*	..	..	..	..	..
	7*	..	..	..	..	..
Dublin . . .	10	4 1	3 2	11	5 0	12 15 0
	7	..	..	..	..	9 15 0

* 10 per cent. is the maximum rate of dividend.

Attention is called by the writer to the undeniably close relationship between low capitalization and a low price of gas; and he goes on to say that theoretically, as the companies in Group B have to distribute on an average 3·6d. per 1000 cubic feet more than those in Group A, we might reasonably argue that the price charged by the former should be only about 3·6d. higher than that charged by the others. But, in reality, there is a difference of 8d., due to the fact that companies which are able to sell their gas at a low price may be said to kill competition, and so do a large business, while those that are saddled with a high price merely foster competition, and therefore are compelled to be content with a smaller volume of business. It is the company with a small capital who find it possible to lower their price; and, having done this, an increased business almost immediately follows.

The writer points out that, among the companies in Group A, Sheffield, owing to its close proximity to the coalfields, is able to supply gas at a very low figure; while the Tottenham and the South Suburban Companies, in spite of cheap capitalization, cannot, owing to comparatively bad situations for obtaining coal supplies, sell gas at low prices. Speaking generally, however, there is no doubt that the low prices for gas are due to economical capital charges; and this point is clearly emphasized if a comparison be made between the two groups. Certain of the companies in Group B bear unmistakable signs of the severe strain of heavy capital outlays—noticeably the Dublin and the Gaslight and Coke Companies. It is interesting to note that the Dublin Company, with a price (3s. 2d.) nearly double that of the Plymouth Company (1s. 9d.), can only boast of 60 consumers per mile of main; while the latter Company have no less than 300 to their credit. In this connection, it is also to be noticed that of the three large London Companies, the South Metropolitan, with the lowest price for gas (2s.), possess 244 consumers per mile of main, and are followed by the Commercial with 228, and the Gaslight and Coke with 214. Here, again, it will be remarked that the Company who charge the highest price for gas have to be satisfied with the smallest proportion of consumers. This is undoubtedly due to the high price of the latter Company, whose consumers would increase by 63,000 if a like number as the South Metropolitan Company have could be secured per mile of main.

Of the eighteen companies selected, fifteen work under the sliding-scale system. Consequently, the dividend may only be increased if the price of gas is reduced; and therefore it is imperative that the investor should make himself acquainted with the rate of dividend allowed for each reduction in the price, so that he may be able to judge of the respective merits of two or more companies. The preceding table shows the present position, and gives the necessary data from which the rate of dividend payable at any future time may be calculated, provided the price of gas is known.

The writer concludes by pointing out that, under the sliding-scale, the shareholders may only receive an increased dividend when the consumers are correspondingly benefited by a reduction in the charge for gas; and it is the latter who mostly gain from a reduction, as "they obtain over 80 per cent. of the monetary loss to the company." "To reduce the price of gas whenever possible is," he says "the undoubted policy of every well-managed company; and the above table shows that this policy has been adopted with considerable success in the past. It cannot be too strongly emphasized that a company with a low price of gas is calculated not only to withstand the severest competition on the part of electricity, but may also reasonably expect satisfactory yearly increases in business."

AMERICAN GAS AND RESIDUALS STATISTICS.

A report on the production of gas, coke, tar, and ammonia in gas-works and in retort coke-ovens during 1905 has been prepared by Mr. Edward W. Parker, of the United States Geological Survey. It is supplementary, in a measure, to the reports on the production of coal and the manufacture of coke, and has been made in response to a demand from producers of gas and coke and the bye-products of tar and ammonia for statistical information on these subjects.

The present report includes, in addition to the statistics of the production of gas, coke, tar, and ammonia at gas-works and in bye-products coke-ovens, a statement of the quantity of gas and tar produced at water-gas works using crude oil for enriching purposes. These statistics have not been considered in any of the preceding reports. At some of the works, oil is used with the coal in the production of gas, but the entire production is included in the statistics of coal gas. From an abstract of the report in "Progressive Age," we learn that in 1905 the total quantities of the products concerned was: 40,454,215,132 cubic feet of gas (not

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 141.

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 12	10½	Alliance & Dublin 10 p.c.	20½–21½	..	4 17 8
245,112	10	,,	7½	Do. 7 p.c.	14–15	..	5 0 0
200,000	5	Nov. 14	7	Bombay, Ltd.. . . .	6¾–7¼	+⅛	4 16 7
40,000	5	,,	7	Do. New, £4 paid	5–5⅛	..	5 1 10
50,000	10	Aug. 30	14	Bourne- } 10 p.c. . .	28–29	..	4 16 7
51,810	10	,,	7	mouth Gas } B 7 p.c. .	17–17½	..	4 0 0
53,200	10	,,	6	and Water } Pref. 6 p.c.	15–16	..	3 15 0
380,000	Stk.	Aug. 15	12½	Brentford Consolidated	260–265	..	4 14 4
300,000	,,	,,	9⅜	Do. New . . .	203–205	..	4 12 8
50,000	,,	,,	5	Do. 5 p.c. Pref. .	120–125	..	4 0 0
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb. .	101–104	..	3 16 11
220,000	Stk.	Sept. 27	11¼	Brighton & Hove Orig.	230–235	..	4 15 8
246,320	,,	,,	8¼	Do. A. Ord. Stk. .	163–168	..	4 18 3
460,000	20	Sept. 27	10	British	41–43	..	4 13 0
104,000	Stk.	Aug. 15	6	Bromley, Ord. 5 p.c. .	121–125	..	4 16 0
165,700	,,	,,	4½	Do. do. 3½ p.c. .	91–94	..	4 15 9
500,000	10	Oct. 12	7	Buenos Ayres (New) Ltd.	11½–12	..	5 16 8
250,000	Stk.	Dec. 13	4	Do. 4 p.c. Deb. .	94–96	..	4 3 4
150,000	20	July 12	8¼	Cagliari, Ltd.	24–26	..	6 6 11
100,000	10	Sept. 27	10	Cape Town & Dis., Ltd.	14–15	..	6 13 4
100,000	10	Oct. 26	4½	Do. 4½ p.c Pref.. .	9¼–9⅝	..	4 12 4
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	50–52	..	5 15 5
50,000	Stk.	Dec. 28	4½	Do. 4½ p.c. Deb. Stk.	£6–98*	..	4 11 10
157,150	Stk.	Aug. 15	5	Chester 5 p.c. Ord. . .	108½–110½	..	4 10 6
1,443,280	Stk.	Aug. 30	5⅛	Commercial 4 p.c Stk. .	110–113	..	4 12 0
560,000	,,	,,	5	Do. 3½ p.c. do. .	107–110	..	4 10 11
475,000	,,	Dec. 13	3	Do. 3 p.c. Deb. Stk.	83–85	..	3 10 7
800,000	Stk.	,,	6½	Continental Union, Ltd.	124–127	..	5 2 4
200,000	,,	,,	7	Do. 7 p.c. Pref.	138–143	..	4 17 11
432,070	Stk.	Aug.	5½	Derby Con. Stk. . . .	122–124	..	4 8 9
55,000	,,	July	4	Do. Deb. Stk. . . .	105–107	..	3 14 9
486,090	10	July 27	11	European, Ltd. . . .	24½–25½	..	4 6 3
354,060	10	,,	11	Do. £7 10s. paid	18–19	..	4 5 10
15,203,110	Stk.	Aug. 15	4⅛	Gas- } 4 p.c. Ord. . .	99–101	+½	4 7 2
2,600,000	,,	,,	3½	light } 3½ p.c. max. .	88–90	..	3 17 9
3,799,735	,,	,,	4	and } 4 p.c. Con. Pref.	107–110	..	3 12 9
4,193,975	,,	Dec. 13	3	Coke } 3 p.c. Con. Deb.	84–86	..	3 9 9
258,740	Stk.	Sept. 13	5	Hastings & St. L. 3½ p.c.	98–103	..	4 17 1
82,500	,,	,,	6½	Do. do. 5 p.c.	118–121	..	5 7 5
70,000	10	Oct. 12	11	Hongkong & China, Ltd.	19½–20½	..	5 7 4
4,940,000	Stk.	Nov. 14	8	Imperial Continental .	177–180	+½	4 8 11
473,600	Stk.	Aug. 15	3½	Do. 3½ p.c. Deb. Red.	95–97	..	3 12 2
183,242	Stk.	Aug. 30	6	Lea Bridge Ord. 5 p.c. .	120–125	..	4 16 0
306,083	,,	June 28	4	L'rpool Unit'd Deb. Stk.	110–112	..	3 11 5

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
561,000	Stk.	Aug. 30	10	Liverpool United A . .	227–229	−2	4 7 4
718,100	,,	,,	7	Do. B. .	167½–163½	..	4 3 1
144,140	Stk.	Sept. 13	7⅝	Maidstone 5 p.c. . .	145–150	..	5 1 8
75,000	5	Nov. 29	5	Malta & Medn., Ltd. .	4¼–4⅝	..	5 5 3
560,000	100	Oct. 1	5	Met. of } 5 p.c. Deb..	101–103	..	4 17 1
250,000	100	,,	4½	Melbourne } 4½ p.c. Deb.	101–103	..	4 7 5
541,920	20	Nov. 14	3¾	Monte Video, Ltd. . .	11½–12½	..	5 12 0
1,675,892	Stk.	Aug. 15	4⅝	Newc'tle & G'tesh'd Con.	110–111	−½	4 3 4
406,625	Stk.	Dec. 28	3½	Do. 3½ p.c. Deb.	96–97*	..	3 12 2
15,000	10	Aug. 30	10	North Middlesex 10 p.c.	20–21	..	4 15 3
55,940	10	,,	7	Do. 7 p.c.	13½–14½	..	4 16 7
300,000	Stk.	Nov. 29	8	Oriental, Ltd. . . .	150–155	..	5 3 3
60,000	5	Sept. 13	7	Ottoman, Ltd. . . .	6–6½	+⅛	5 7 8
398,490	5	Oct. 26	7	Primitiva Ord. . . .	7⅛–8	+⅛	4 7 6
796,980	5	July 27	5	Do. 5 p.c. Pref. .	5½–5⅝	..	4 10 11
488,900	100	Dec. 1	4	Do. 4 p.c. Deb. .	94–96	..	4 3 4
851,070	10	Oct. 12	7	River Plate Ord. . . .	12¼–12⅝	..	5 7 8
300,000	Stk.	Dec. 28	4	Do. 4 p.c. Deb. .	95–97*	..	4 2 6
250,000	10	Sept. 27	8	San Paulo, Ltd. . . .	13¼–13⅜	..	5 16 5
70,000	50	Jan. 2	5	Do. 5 p.c. Deb. .	48–50*	..	5 0 0
135,000	Stk.	Sept. 13	10	Sheffield A	248–250	..	4 0 0
209,984	,,	,,	10	Do. B	248–250	..	4 0 0
523,500	,,	,,	10	Do. C	248–250	..	4 0 0
70,000	10	Oct. 26	10	South African	15½–16½	..	6 1 3
6,350,000	Stk.	Aug. 15	5⅛	South Met., 4 p.c. Ord.	128–130	..	4 4 7
1,895,445	,,	July 12	3	Do. 3 p.c. Deb.	85–87	..	3 9 0
201,720	Stk.	Sept. 13	8	South Shields Con. Stk.	136–158	..	5 1 3
575,000	Stk.	Aug. 15	5⅛	S'th Suburb'n Ord. 5 p.c.	123–126	..	4 7 4
60,000	,,	,,	5	Do. 5 p.c. Pref. . .	123–126	..	3 19 4
112,533	,,	July 12	5	Do. 5 p.c. Deb. Stk.	128–133	..	3 15 2
502,310	Stk.	Nov. 14	5	Southampton Ord. . .	105–110	..	4 10 11
120,000	Stk.	Aug. 30	6½	Tottenham } A 5 p.c. .	127–130	..	5 0 0
388,020	,,	,,	5	and } B 3½ p.c. .	104–106	..	4 14 4
137,500	,,	Dec. 28	4	Edmonton } 4 p.c. Deb.	101–103*	..	3 17 8
182,380	10	,,	8	Tuscan, Ltd.	1⅛–1¼*	..	7 5 6
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	102–104*	..	4 16 2
193,742	Stk.	Sept. 13	5	Tynemouth 5 p.c. max.	106–108	..	4 12 7
30,000	Stk.	Aug. 15	8	Wands- } A 5 p.c. . .	—	..	—
255,636	,,	,,	6½	worth } B 3½ p.c. . .	140–145	..	4 9 8
75,000	,,	,,	5⅝	and } C 3½ p.c. . .	113–115	..	4 17 6
79,416	,,	Dec. 28	3	Putney } 3 p.c. Deb. Stk	79–82*	..	3 13 2
279,875	,,	Aug. 15	5⅛	West Ham 5 p.c. Ord. .	103–105	..	4 17 7
185,000	,,	,,	5	Do. 5 p.c. Pref. . .	120–123	..	4 1 4
193,300	,,	Dec. 28	4	Do. 4 p.c. Deb. Stk.	101–104*	..	3 16 11

Prices marked * are "Ex div."

including that lost or wasted), 5,751,378 short tons of coke, 80,022,043 gallons of tar, 38,663,682 lbs. of sulphate, and 46,986,268 gallons of ammoniacal liquor; against 34,814,991,273 cubic feet of gas, 4,716,049 short tons of coke, 69,498,085 gallons of tar, 52,220,484 gallons of ammoniacal liquor, and 28,225,210 lbs. of sulphate in 1904. The total value of all these products in 1905 was $56,684,972, compared with $51,157,736 in 1904.

Oil and Water Gas.—Returns were received from 477 companies producing oil and water gas; and these show that the total production of water gas in 1905 was 82,959,228,504 cubic feet. Of this quantity, 5,547,203,913 cubic feet, or 6·7 per cent., was lost by leakage, &c.; leaving 77,412,024,591 cubic feet as the net production obtained and sold. As the quantity of gas made and sold at the coal gas and bye-products coke-oven works was 40,454,215,132 cubic feet, it seems that the consumption of water gas and gas made from crude oil was nearly twice as much as that produced from coal. It also appears that, while the average price of coal gas in 1905 was 81·4 c. per 1000 cubic feet, that of oil and water gas combined was a fraction of a cent in excess of $1. Still further comparison shows that whereas 66 per cent. of the production of coal gas was sold for lighting, 77 per cent. of the combined production of oil and water gas was used for this purpose.

Coal.—For the fourth time in the history of the United States, the production of coal in 1905 reached a total of more than 300 million short tons; showing an actual output of 392,919,341 tons of 2000 lbs., valued at $476,756,963. Of this total, the output of anthracite coal amounted to 69,339,152 long tons (equivalent to 77,659,850 short tons), which, as compared with the production of 65,318,490 long tons in 1904, was an increase of 4,020,662 long tons, or 6 per cent. The value of the anthracite coal at the mines in the year 1905 was $141,879,000, against $138,974,020 in 1904. The output of bituminous coal (which includes semi-anthracite and all semi-bituminous and lignite coals) amounted in 1905 to 315,259,491 short tons, valued at $334,877,963, compared with 278,659,689 short tons, valued at $305,397,001, in 1904. The increase in the production of bituminous coal in 1905 over 1904 was therefore 36,599,802 short tons in quantity and $29,480,962 in value.

Coke.—The coke production of the United States in 1905, which included the output from 3159 retorts or bye-products ovens, amounted to 32,231,129 short tons, compared with 23,661,106 short tons in 1904. The increase in the quantity in 1905 over 1904 was 8,570,023 short tons, or 36·22 per cent. The total value was $72,476,196, against $46,144,941 in 1904—a gain of $26,331,255, or 57 per cent. The average price per ton in 1905 was $2·25, against $1·95 in 1904. The average output from the bye-products ovens in 1905 was 1158·8 tons per oven, against an average of 365·8 tons per oven from the beehive ovens.

Gas, Coke, Tar, and Ammonia.—The aggregate value of all the products obtained from the distillation of coal in gas-works and retort-ovens in the year 1905 was $56,684,972, against $51,157,736 in 1904 and $47,830,600 in 1903.

Natural Gas.—The value of the natural gas produced in 1905 was $41,562,855, compared with $38,496,760 in 1904, $35,807,860 in 1903, $30,867,863 in 1902, $27,066,077 in 1901, and $23,698,674 in 1900—a gain of about 8 per cent. in 1905 over 1904.

Petroleum.—The total production of crude petroleum in the United States in 1905 was 134,717,580 barrels, against 117,080,960 barrels in 1904, 100,461,337 barrels in 1903, 88,766,916 barrels in 1902, and 69,389,194 barrels in 1901—an increase of 17,636,620 barrels, or 15 per cent., over the production of 1904, and of about 34 per cent. over that of 1903. The value of crude petroleum produced during 1905 was $84,157,399, or an average price of 62·47 c. per barrel, against $101,175,455, or 86·41 c. per barrel, in 1904, and $94,694,050, or 94·26 c. per barrel, in 1903.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

To-night's meeting of the Western District of the Scottish Junior Gas Association can be regarded in no other light than as a continuation of the high level of excellence to which the Association, in its as yet brief existence, has attained. If anything, the *agenda* to-night was too full; for either of the subjects dealt with would have been sufficient of itself to have made the meeting quite illustrious. The evening was purely a Glasgow one, so far as the subjects were concerned; and of the speakers, only one hailed from outside the city boundaries—which reveals once more, if that were really needed, the wealth of ability that is to be found in and around the great hive of industry which is contained under the dome of the Glasgow Corporation Gas Department. The papers were read first, and the discussion was intended to be taken upon both together; but, somehow, perhaps quite naturally, the subjects separated themselves, and did not commingle. This did not, however, detract from the value of the remarks which fell from the speakers. Mr. John Wilson led off with a description of the gas-turbine which has been installed at Provan, and gave an account of this wonderful machine, by letterpress and illustration, which must have been, to many, the first enlightenment as to the construction and working of the interior of the now world-famous steam-turbines. From the remarks of Mr. Alex. Wilson, it appears that the idea of using the Parsons turbine originated with him, and even that he had some difficulty in getting his idea carried into effect. According to Mr. Lowe, theoretically, the machine is not an ideal one. After the testimonies, however, of Mr. Wilson, the author, of Mr. A. Wilson, the Engineer, and of Mr. J. Webster, the Manager at Provan, it would appear that, for efficient and economical working on a very large scale, the turbine gas-exhauster is a great success, and will, whatever advance may be made on it, never be gone back upon. A word of praise is due to Mr. John Wilson for his very clear and full statement of the form, and of the working, of the turbine; and the tests which he gave, for which he acknowledged his indebtedness to

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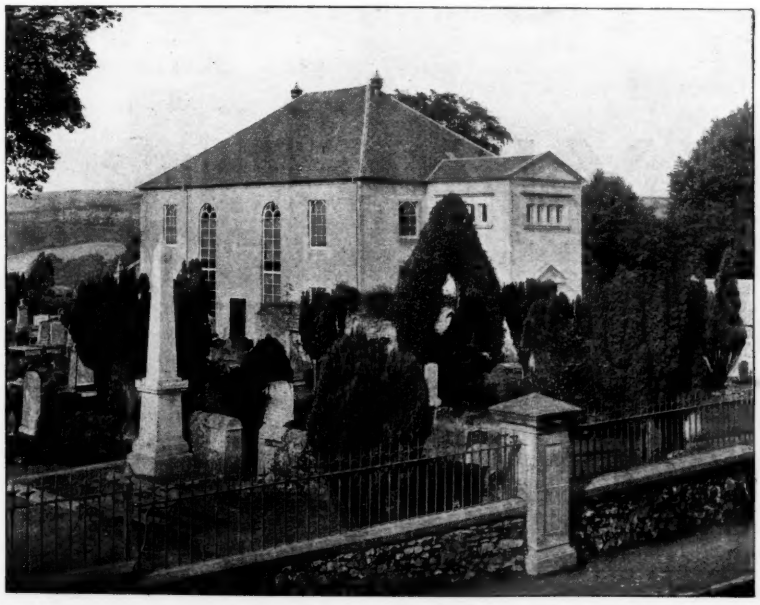

ROTHESAY PARISH CHURCH.

Wrights the Radiator People.

Mr. J. Lowe, are a complete vindication, were they nothing else, of the adoption of the turbine exhauster. Mr. Wilson having dealt with a mechanical subject, Mr. J. M. Popplewell, the Chemist in the Chemical Works at Provan, which are leased from the Corporation by Messrs. Brotherton and Co., Limited, of Leeds, followed with a severely scientific subject—coal-tar distillation. Mr. Popplewell treated the subject happily; giving both present satisfaction to the members and powerful aid, as well as stimulus, to them to use the information he gave in future investigations which they may conduct on their own behalf. After the meeting, the feeling was that this season the Western District are having a most satisfactory time.

The advertisements which were issued by the Corporation of Falkirk, inviting applications for the post of Gas Manager, have been responded to by forty gentlemen. The applicants reside in all parts of the United Kingdom. On Tuesday of this week, the Town Council held a special meeting, at which the applications were opened. They were then remitted to the Gas Committee, who will meet next week to draw up a short leet.

The subject of the carriage of coke from Dundee occupied the attention of the Town Council of Dundee on Thursday. Lord Provost Longair referred to the resolution which had been adopted by the Council at a previous meeting, in his absence, to oppose the proposals of the Harbour Trustees and the Railway Companies as to the carriage of coke from the gas-works to the harbour. The latter two parties have entered into an agreement to the effect that not more than 1000 tons of coke be carried in any one year. The position taken up by the Railway Companies was that the lines were congested with passenger traffic, and that for the public safety they could not undertake the work. He moved that they do not oppose. Bailie Melville, who moved that they adhere to their opposition, objected to the Harbour Trustees legislating for the Corporation. Several other members having expressed their opinion, the Lord Provost, on account of the strong feeling in the Council on the subject, withdrew his motion, and it was agreed to continue the opposition.

The want of lighting facilities in Fauldhouse—a village of about 3000 inhabitants, in Linlithgowshire—is being felt. On Monday evening, a meeting of the inhabitants was held to consider the subject; and a Committee was appointed to obtain information regarding the lighting arrangements in neighbouring villages. Some of the speakers advocated the formation of a Gas Company. In the neighbouring village of Shotts, a Gas Company was formed three years ago; and the success which it has attained, and the satisfaction it has afforded to the community, are probably factors in the movement which has now been initiated at Fauldhouse.

The petition by Wm. Glass and others, asking that the Grantown Gaslight Company, Limited, be wound up under the supervision of the Court, which I mentioned in my "Notes" of Dec. 25 last, was granted by the Second Division of the Court of Session yesterday, without any opposition having been offered. The liquidation was placed under the supervision of Lord Dundas.

At the Peterhead Town Council on Monday, it was reported by the Gas Manager—Mr. W. Ritchie—that the gasholder accommodation was insufficient, and he proposed that Nos. 1 and 2 holders be removed and replaced by others, and that a third one be erected upon a site where a holder previously existed. This would give four holders of 45,000, 47,000, 112,000, and 25,000 cubic feet capacity respectively—a total of 229,000 cubic feet. The estimated cost is £2250. The Town Council adopted the proposal. The maximum daily make of gas is 191,600 cubic feet. The Manager was also, on his own recommendation, authorized to lay enlarged mains in various parts of the town.

Complaints as to the public lighting of Montrose have become so loud that notice of them was taken in the Town Council on Monday, and it was resolved to send a protest in the matter to the Electric Lighting Company who have the contract for the lighting.

A novel fire alarm is intimated from Edinburgh, but one which cannot be depended upon to act satisfactorily in daily use. On Wednesday morning, a medical gentleman was awakened by the violent ringing of his telephone bell. When he got up he discovered that his house was on fire, and he summoned the Fire Brigade, who succeeded in extinguishing the flames, though not till considerable damage had been done. The telephone had been set a-ringing by the heat of the fire having fused a telephone wire, which then came into contact with a gas-pipe, and thus made a short circuit.

An Aberdeen Suicide by Gas.—On the morning of Sunday, the 6th inst., Wm. M'Donald (66), a granite cutter, was found dead in bed in his house in Jute Street, Aberdeen. His death was self-inflicted, as it was found that he had attached a piece of india-rubber tubing to an open gas-tap, and placed the other end in his mouth. He had been in ill-health and depressed in spirits.

Thefts from Prepayment Meters.—At the County of London Sessions last Wednesday, William Grossman and Robert Williamson pleaded "Guilty" to stealing money from prepayment meters, the property of the South Metropolitan Gas Company. Previous convictions for similar offences having been proved, prisoners were sentenced to fifteen and twelve months' imprisonment respectively, with hard labour.

Welsh Authorities and the Birkenhead Water Scheme.—At a special meeting of the Denbighshire County Council, held for the purpose of considering the advisability of opposing the Welsh water scheme of the Birkenhead Corporation, the following resolution was passed: "That the Council approve of, and concur in, the opposition by the Flintshire, Anglesey, Carnarvonshire, and Merionethshire County Councils, and the Visiting Committee of the North Wales Asylum, or the combined opposition of such Councils, &c., to the Birkenhead Corporation Bill; that the said Visiting Committee be authorized to take all such proceedings as may be necessary in the matter; and that the proportion of the expense due from the Council in connection therewith be defrayed out of the county fund and rate."

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CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Jan.* 12.

Sulphate of Ammonia.

There has been more interest in the market during the week and more buying; but supplies have been fairly plentiful, and any improvement in values has only been fractional. The closing quotations are £11 12s. 6d. per ton f.o.b. Hull, £11 15s. per ton f.o.b. Liverpool, and £11 17s. 6d. per ton f.o.b. Leith. Efforts have been made to get in at about prompt prices for February and March delivery, but without much success; makers being inclined to wait for a recovery in values, and speculators being nervous about taking liberties with the market for delivery ahead at near the present level.

Nitrate of Soda.

This article is steady at 11s. 3d. per cwt. for 95 per cent., and at 11s. 9d. for refined quality.

LONDON, *Jan.* 12.

Tar Products.

Markets have been generally firm during the past week, with the exception of pitch, which remains very dull. Business is reported to have been done in London at under 25s. for prompt delivery, and probably a further quantity could be secured at this figure. On the east coast, pitch has been offered at 24s. 6d. and refused; while contracts have been made at other places on the east coast at 24s. for delivery over the next 3-4 months. On the west coast, it is reported that pitch has been offered at 24s. 6d. without success; but in some places difficulty has been experienced in securing small quantities to complete prompt shipments, and fair prices have been paid. Rather good business has been done in South Wales for delivery from now to the end of June at market prices; but the demand from the Continent is slight. Creosote is very firm, though in London some quantity of oil has lately been sold at 2d. per gallon for prompt delivery. In the Midlands, very little can be secured; while in the North makers are evidently well sold, and will not give any consideration to less than 2d. all round at their works. In carbolic acid, Continental consumers report that they are securing supplies at 1s. 8½d. for 60's.; while English consumers refuse to offer more than 1s. 8d. at makers' works. There is no alteration reported in the market for crystals. Solvent naphtha is firm, makers quoting from 1s. 2½d. to 1s. 3d. on the east coast; while in London, 1s. 4½d. to 1s. 5d. is asked for small quantities for prompt delivery. For forward, makers do not care to quote. Toluol is steady for both pure and 90 per cent.; and prices remain unchanged. Benzol is scarce in London; but in the North, lower prices are reported to have been accepted. There is no alteration in the quotation for 50-90 per cent. A fair quantity of tar has been sold in London at a very low price delivered to distillers' works.

The average values during the week were: Tar, 13s. to 17s. Pitch, London, 24s. 9d. to 25s.; east coast, 24s. to 24s. 6d.; west coast, 24s. to 25s. Benzol, 90 per cent., 11⅛d. to 1s. 1d.; 50-90 per cent., 11¼d. to 1s. Toluol, 1s. 1½d. to 1s. 2d. Crude naphtha, 4⅜d. to 5⅛d.; solvent naphtha, 1s. 2½d. to 1s. 4⅜d.; heavy naphtha, 1s. 3d. to 1s. 5d. Creosote, London, 2d. to 2¼d.; North, 1⅝d. to 2d. Heavy oils, 2⅛d. to 2⅜d. Carbolic acid, 60 per cent., 1s. 8½d. to 1s. 9d. Naphthalene, £4 10s. to £9 10s.; salts, 33s. to 35s. Anthracene, "A" quality, 1⅛d. to 1⅜d.

Sulphate of Ammonia.

The market is quiet. Towards the end of the week, however, there has been a decidedly steadier tone; and it appears probable that we have seen the bottom. No business of importance has been reported in London, though doubtless ordinary makers would accept less than the nominal quotation of £12 2s. 6d. made by the principal Gas Companies. In Hull, £11 15s. has again been paid for best makes; but no business is reported in ordinary qualities. In Liverpool, the value may be taken as £11 15s; while in Leith, the nominal quotation is £11 17s. 6d. In all quarters there is a desire to buy for forward delivery; but at present the premium asked by makers is no encouragement.

Fatal Gas Explosion.—News reached London yesterday from various sources of an explosion of a gasholder at Montagnana, a town near Padua, with 12,000 inhabitants, on the night of Wednesday last. Three workmen were killed, and several others badly wounded. The whole town was plunged in darkness.

Cardiff Water Supply.—The Water Committee of the Cardiff Corporation have decided to ask the permission of the Council to take preliminary steps in connection with the construction of another reservoir in the Taff Fawr Valley. The new reservoir will be the largest of the three, and will have a capacity of 900 million gallons; the capacities of the other two being 322 and 345 million gallons respectively. Mr. C. H. Priestley, the City Engineer, has drawn up a report on the water supply during the past year, in which he states that 603 new services were connected, compared with 342 in 1905. The average consumption per day was 5,646,383 gallons, or 26·26 gallons per day per head on an estimated population of 215,000. The quantity of water pumped at Cogan during the year was 212,400,000 gallons, compared with 117,393,000 gallons in 1905.

A Leaking Submerged Water-Main.—A difficulty has again arisen through a leakage in the water-main which serves Saltash. The supply is derived from the Plymouth Water-Works, and is conveyed to Saltash in a 5-inch main laid with flexible joints under the River Tamar. The bed of the river is very uneven, so that the pipe is only imperfectly supported; and probably from this cause leakages have occasioned some trouble. In the present case, the divers have located the fracture at a spot where the river is 56 feet deep, and a layer of 3 feet of mud covers the pipe. The work of repairing the damage under such circumstances is difficult and costly. The Saltash Corporation are anxious to enter into an arrangement with the Great Western Railway Company for the laying of the main along the Royal Albert Bridge; but the Company do not appear desirous of allowing this to be done.

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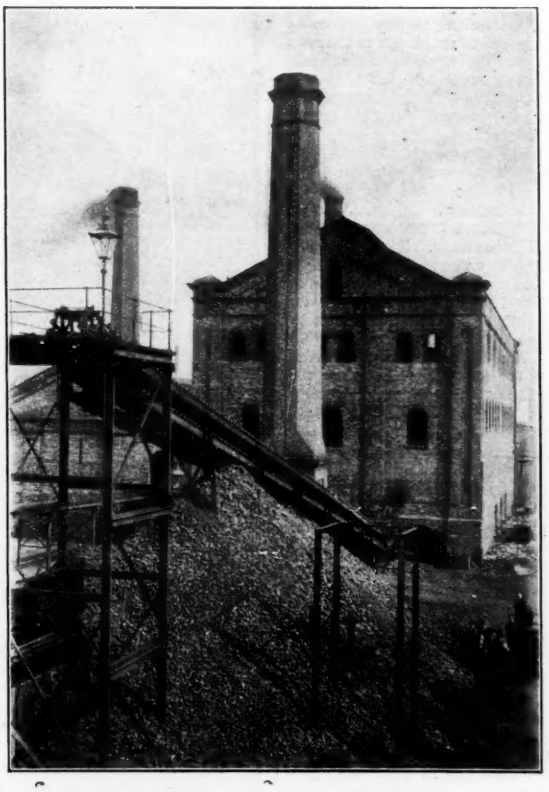

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COAL TRADE REPORTS.

Lancashire Coal Trade.

The demand for coal for commercial purposes at present is almost greater than the supply. Colliery proprietors, however, are not wholly to blame for this. They have not had empty trucks returned to the pits as regularly as hitherto, and consequently could not get the stuff away. There has been no difficulty in getting from consumers the newly enhanced prices for coal. Prices therefore remain steady. Contracts for gas coal and cannel are being considered. An advance on last year's contracts, judging from present circumstances, will be general. Quotations in the Lancashire district are: Best house coal 14s. to 15s. per ton, secondary 13s. to 14s., common 9s. 6d. to 12s. 6d., burgy 8s. to 9s., best slack 7s. 3d. to 7s. 9d., medium 7s., common 6s. to 6s. 9d., coal for bunkers 10s. to 10s. 6d., and furnace coke 17s. to 24s.

Northern Coal Trade.

The coal trade is now more active; the production at the collieries is fuller, and there is a demand that takes it up well. But with the greater output and the satisfying of the demand, prices show a little ease for some classes of fuel. In steam coals, the quotation is now based on about 12s. 6d. per ton f.o.b. for best Northumbrians, and about 11s. 6d. for second-class steams. Steam smalls are now rather less scarce, and the quotation is from 7s. to 7s. 6d., with a fair request for this season of the year. In the gas coal trade, the demand continues very full; and as stocks were reduced in the holiday period, the great users are taking coal freely for purposes of replenishment. Durham gas coals vary from about 10s. 6d. to 11s. 6d. generally, according to quality; but the very best classes are quoted up to 12s. 6d. per ton f.o.b. At the same time, the period of the highest consumption of gas coal is now passing, and a week or two may ease the demand. As to contracts, the tenders are in for the Copenhagen Gas-Works, at higher figures; but no settlement is reported as yet. The inquiry for coke is very full, and prices are high; but this is partly due to scarcity. Gas coke is steady; and the price may be put as about 13s. 6d. per ton f.o.b. for good descriptions, on the Tyne.

Scotch Coal Trade.

Trade has started off with undiminished vigour, and there is every appearance of its continuing to be active for some time. Prices are still rising. The quotations are: Ell 10s. 6d. to 11s. 9d. per ton f.o.b. Glasgow, splint 11s. 9d. to 12s., and steam 10s. 6d. to 10s. 9d. The shipments for the week amounted to 97,787 tons—a decrease of 158,089 tons upon the previous week, and of 4878 tons upon the corresponding period of last year.

Gas Supply of Bilston.

At the annual meeting of the Bilston Gas Company on Monday last week, when moving the adoption of the report of the Directors, noticed in the "JOURNAL" for the 1st inst., the Chairman (Mr. Harold Holcroft) observed that during the year they had maintained their position, notwithstanding the fact that the sales of gas showed a small decrease. This was due to several causes. There was a general adoption of incandescent burners, which effected a saving to the customers of one-third of the quantity of gas used without them. In the long run, there was no doubt these incandescent burners would be to the advantage of the Company. At a low estimate, in a small district like theirs, the effect was a saving to the consumers of from 10 to 15 million cubic feet of gas. The fact that some of the large consumers were using waste power at their works to generate electricity, also made a difference to the Company. One feature of importance was that they suffered from the difficulties of being in a mining district; and, though the coal was supposed to be worked out, the ground had not settled, and the number of broken mains was astonishing. There had, however, been an improvement in this respect by 2 per cent. With regard to the sale of residuals, they had not showed any great vitality. The sulphate of ammonia market was stationary; while tar had a downward tendency. Mr. J. Jones seconded the motion. Mr. R. D. Lewis supported it, appealing to the Directors to adopt a more progressive policy, and offer an inducement to small consumers. The Chairman said they did not fear competition from the electric light, and they were getting more smaller consumers; but it took a large number of them to make up for the loss of one large consumer. The report was unanimously adopted, and it was decided to pay further dividends of 5s. 6d. and 4s. on the "A" and "B" shares respectively, in addition to the interim dividend. The retiring Directors and Auditors having been re-elected, the Chairman referred to the death of Mr. Reeves, the Engineer and Manager, who had been connected with the Company for 43 years; and he mentioned that Mr. W. H. Adams, late Manager of the Gosport Gas Company, had been appointed in his place.

A failure of the electric light in the neighbourhood of Hammersmith caused much inconvenience last Wednesday evening. Olympia was in darkness for about ten minutes; and then gas was utilized as an illuminant.

In the "JOURNAL" last week, we called attention to an effective leaflet issued by Mr. James Paterson, the Engineer and Manager of the Redhill Gas Company, setting forth in a striking manner the advantages of gas as compared with the electric light. We find that something on the same lines has been done by Mr. E. S. Pike, the Secretary of the Reigate Gas Company. He has selected a pair of scales as his medium; and on his leaflet he shows by the angle of the beam the value of an incandescent gas light as compared with an electric glow lamp. He urges his reader to "Be wise and have a balance on the right side;" in other words (as fully set forth in bold type), to have a light of 80 candles for seven hours for 1d. by gas, instead of paying 1s. for it by electricity, which sometimes leaves its user in the dark. The competition of electricity has evoked a good deal of advertising ingenuity which would otherwise have lain dormant; and it must be productive of good results to the gas industry.

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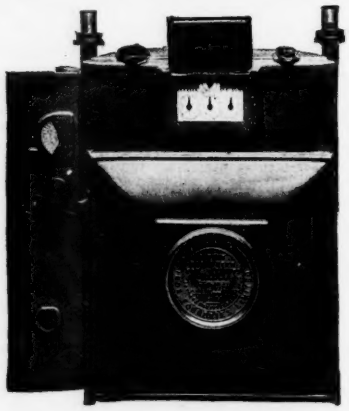

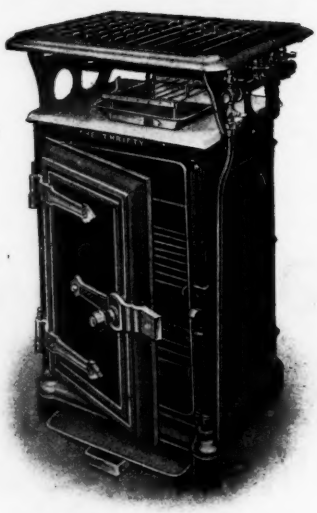

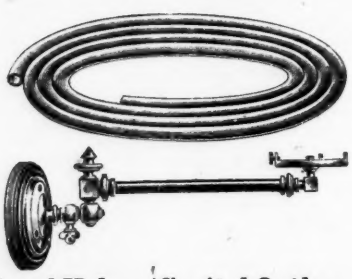

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New Water-Works for Wolverhampton.

Mr. P. M. Crosswaite, on behalf of the Local Government Board, held an inquiry last week into an application by the Wolverhampton Corporation for sanction to borrow £90,000 for the purposes of the water undertaking. The Town Clerk (Mr. H. Brevitt) explained that the water area comprised 42,750 acres, the dependent population was 150,000, and the houses 33,372. In 1845, the water undertaking belonged to the old Wolverhampton Water-Works Company, who erected a pumping-station and constructed a well at Tettenhall. Between 1851 and 1852, the same Company erected a pumping-station and sinking at Goldthorn Hill, where there was also a covered reservoir. In 1856, the Wolverhampton New Water-Works Company came into existence, and purchased the undertaking of the old Water Company. This Company constructed a pumping-station at Cosford and a reservoir at Tettenhall; and in 1868, the works were acquired by the Corporation. The present yield was slightly over 4 million gallons daily; and the estimated consumption for all purposes was 21·57 gallons per head. With regard to the cost of the proposed new works, the Town Clerk explained that £5000 had to be paid to the Staffordshire and Worcestershire Canal Company as compensation. The preliminary expenses were to be put down as £2000 odd; and the trial boring and testing operations at Tettenhall—which had been eminently successful both in respect of the quantity and quality of the water—involved an expenditure of £2000 odd. The permanent boreholes, which would be sunk to a depth of 1000 feet, together with their lining tubes, would cost £6000. There would be no charge on the rates of Wolverhampton in respect of the proposed new works. The Borough Analyst (Mr. Jones) said he had tested the water; and organically it was better than their present supply. In time, the Wolverhampton water would be better than it had ever been.

Birmingham Water for Coventry.

At a public meeting held last Thursday, the ratepayers of Coventry approved of the scheme for obtaining a supply of water from the Shustoke reservoir of the Birmingham Corporation; and the Bill to enable this to be done will therefore be proceeded with. The meeting was not a large one; but 76 voted for the proposal, and only 2 against. Alderman Bird, the Chairman of the Water Committee, explained the need for an increased supply, and outlined the scheme. He said that, in the first place, Coventry, at its own expense, was to lay a line of pipes to connect their reservoirs with the delivery main from the Birmingham pumping-station at Whitacre. Birmingham was to deliver into the pipes such a supply of water, not to exceed at any time 2 million gallons per day, as Coventry might from time to time require; and Coventry was to pay Birmingham for the water supplied at the rate of 4d. per 1000 gallons, subject to a minimum rate of £1250 per quarter—this rate to entitle Coventry to a minimum supply of 75 million gallons in that quarter. Nothing in the agreement was to be construed as a guarantee of purity; but Birmingham was to use all reasonable care and diligence to prevent pollution, and to secure the purity of the water delivered to Coventry. If at any time the water failed to reach the standard of purity reasonably required by Coventry, the city might terminate the agreement or require Birmingham to provide a supply of Welsh water, instead of water from the River Bourne. The price was to be mutually agreed between Birmingham and Coventry, or, failing agreement, to be settled by arbitration. The estimated expenditure on the main and the subsidiary works and the reservoirs for the storage of the water required for an additional supply—whether the water was obtained from Birmingham, as proposed, or from any other source—was £81,000. Power was also being sought by the Bill to borrow such further money as might be necessary for any of the purposes of the undertaking. Reference was also made by Alderman Bird to the larger needs of the future; and he explained that, though they would take 2 million gallons a day, Whitacre could supply them with 10 million gallons.

Increased Sale of Gas at Winchester.—In spite of very keen competition from the Winchester Electric Light Company, the output of gas by the Water and Gas Company during the six months ending the 31st of December last was 5 per cent. greater than in the corresponding period in 1905. Another gratifying feature of the half year's working has been that the efforts of Mr. H. C. Head, the Company's General Manager, to reduce the unaccounted-for gas have been rewarded by the fact that whereas the quantity of gas sent out is only 5 per cent. more, the gas actually sold is 8 per cent. greater.

The Empire Light Company, Limited, has been registered with a capital of £10,000, in £1 shares.

The £3000 of perpetual 4 per cent. debenture stock of the Guildford Gas Company, recently created, has been sold by tender; the average price realized being £102 6s. 2d. per £100.

An announcement which recently appeared in the "JOURNAL" notified that the Tottenham and Edmonton Gas Company are about to sell by tender £11,970 of 4 per cent. perpetual debenture stock, at a minimum price of £104 per £100. This is the remaining portion of the amount authorized by the Company's Act of 1898 to be raised by the issue of debenture stock. Tenders will be received up to Monday, the 28th inst., and interest will accrue from the 1st prox.

It is reported that the contract for a power-gas installation at Fuji, near Yokohama, Japan, has been given to the Power-Gas Corporation, Limited, of Stockton-on-Tees. The gas plant will have a rated capacity of 3000 I.H.P., designed to produce about 180,000 cubic feet of gas per hour from local fuels. The whole of the gas will be cleansed and made suitable for use in engines.

We have received from the Pneumatic Gas Lighting Company, Limited, their new season's catalogue, which shows that the Company are introducing many improvements. It has been compiled on totally different lines from their last year's issue; the matter being put in a more convenient form for buyers. The Company have carried out some very successful installations in churches; and their tender for the lighting up of the Bethnal Green Fire Station, under the London County Council, has just been accepted.

THE "BLAND" LIGHT IN CHURCH.

ACTUAL FACTS

ST MARY'S HOUSE.
ROSS.

4th Jany 1907

Dear Sirs

I have today received from the Ross Gas Co. the amount of Gas consumed in Ross Church during Xmas Quarter 1906.

The success of the Bland Burner has exceeded my expectations.

The Saving on this quarter alone has been 33.400 ft. to the value of £6. 13. 7.

Yours Truly
Xmas Qr. 1905
Naked Burners 65.200

Xmas Qr. 1906
Bland Light 31.800
33.400.

During the whole of this past quarter we have not renewed a single mantle or globe.

Yours faithfully
W. Watson
Churchwarden Ross Parish Church

For full details respecting the "Bland" Light for
CHURCH, FACTORY, SHOP, & DOMESTIC LIGHTING,
WRITE TO—
BLAND & CO., 63, Queen Victoria St., London, E.C.

Opinions regarding electricity, we know, differ; and the fact was emphasized a few days ago during the hearing of a case in which a Leeds firm of clothiers were summoned for breaches of the Factory and Workshops Act. The Inspector complained of the lack of ventilation; and he suggested that the conditions could be materially improved by giving up gas and using electric light, and by mechanically introducing fresh air by means of fans. On the other hand, however, a member of the firm said he did not feel inclined to put electric light in the premises, because it injured the eyes and everything else. He did not think their girls could work with it.

At the meeting of the Rochdale Corporation Gas Committee, last Wednesday, the Whitworth District Council again wrote asking Rochdale to supply gas in the Whitworth Valley; but for various reasons the Committee decided that they could not grant the request.

The Directors of the Walker and Wallsend Gas Company recommend the following dividends for the past year: Upon the preference stock, at the rate of 5 per cent. per annum; upon the 3½ per cent. ordinary stock, at the rate of £4 17s. 6d. per cent.; and upon the 5 per cent. ordinary stock, at the rate of £6 7s. 6d. per cent. These are the maximum dividends.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

MANAGER. Calne Gas and Coke Company. Applications by Jan. 21.
GENERAL FOREMAN. No. 4691.
WORKING CARBONIZING FOREMAN. No. 4696.
TRAVELLER. No. 4699.
REPRESENTATIVE (Coal). No. 4694.
SUNDRIES AND STORES CLERK. No. 4690.

Situations Wanted.

POSITION IN OFFICE OF CONSULTING ENGINEER (View to Partnership). No. 4695.
ACCOUNTANT OR SECRETARY. No. 4697.
RENTAL OR GENERAL CLERK. No. 4700.
GASFITTER, &c. No. 4698.

Plant, &c., for Sale.

COMPLETE GAS-WORKS PLANT AND APPLIANCES (NEW STREET GAS-WORKS, EDINBURGH). Edinburgh and Leith Gas Commissioners.

Stocks and Shares.

ATTLEBOROUGH GAS COMPANY.

High Pressure Distribution. No. 4693.

TENDERS FOR

Coal.

NEWTOWNARDS GAS DEPARTMENT. Tenders by Jan. 31.

Fire-Clay Goods.

BURY GAS DEPARTMENT. Tenders by Jan. 19.

Mantles, Protectors, &c.

PLYMOUTH LIGHTING DEPARTMENT. Tenders by Jan. 31.

Retort-Bench Brickwork.

BURY GAS DEPARTMENT. Tenders by Jan. 22.

Washers.

MANCHESTER GAS DEPARTMENT. Tenders by Jan. 21.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

TERMS OF SUBSCRIPTION to the "JOURNAL."

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Payable in advance. If credit is taken, the charge is 25s. a year.

Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

Subscribers who desire to avail themselves of the reduction in the Subscription by paying in advance for the Year 1907, are reminded that this can only be done during the current month.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE,

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

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"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

"VITERNUS" METALLIC PAINT FOR GAS-WORKS PLANT.
JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
Telegrams: "ENAMEL." National Telephone 1759.

BROTHERTON & CO., LIMITED.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
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GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

INCREASE YOUR MAKE.
SEND for Particulars of the "RAPID" Carburettor. Why be short of Gas when you can stretch the make from 1000 to 2000 cubic feet per ton, without any difficulty?
BIGGS, WALL, & Co., 13, Cross Street, Finsbury Pavement, LONDON.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
Telegrams:—
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SPENT OXIDE PURCHASED IN ANY DISTRICT.

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CHARLES E. FRY, LEAMINGTON,
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

SIMMANCE-ABADY RECORDING Thermometers, Recording Pressure Gauges, and CO_2 Recorders, &c.

ALEXANDER WRIGHT & CO., LTD.,
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ANTIMONY OXIDE MANUFACTURERS—
FOR COATING GASHOLDERS, &c.;
ALSO BUYERS OF RETORT CARBON ANY QUANTITY.

WALSAM DAVEY AND CO.,
REGENT HOUSE, REGENT STREET,
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MEADE-KING, ROBINSON, & CO.
Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 18, EXCHANGE STREET, MANCHESTER, and 11, OLD HALL STREET, LIVERPOOL.

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(NATURAL.)
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS
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SULPHURIC ACID.

SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, & MESSEL, LTD.
with which is amalgamated WM. PEARCE & SONS, LTD.),
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Telephone: 341, AVENUE.

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FOR Rapid and Economical Handling of Coal and Coke in Gas-Works.
Next Illustrated Advertisement will appear on Jan. 22.
TEMPERLEY TRANSPORTER COMPANY,
72, BISHOPSGATE STREET WITHIN, LONDON, E.C.
Telephone: 365 LONDON WALL. Telegrams: "TRANSUMO."

THE KEITH LIGHT.
4000 INSTALLATIONS IN DAILY USE.
SEE illustrated advertisement in next week's issue.
JAMES KEITH AND BLACKMAN CO., LTD., 27, Farringdon Avenue, LONDON, E.C.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Exchanged for Spent Oxide.
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